Volume XV, Number 3. SEPTEMBER, 1898. $2.00 Per Year, Including Directory. 20 Cents per Copy.

TEXTILE WORLD.

With which is Incorporated the

INDUSTRIAL RECORD

LIBRARY OF CONGRESS RECEIVED SEP 14 1898 PERIODICAL DEPT.

The Textile World's Complete Directory of the Mill Trade and of Large Buyers of Textile Fabrics, for 1898, is now ready for delivery. It contains 400 pages, and 19 textile maps; several valuable new features have been added.

	PAGE
Portrait and Sketch of Albert Curtis	23
Our Foreign Commerce	25
Manufactures of Massachusetts	26
Tariff on Woolen Clippings	29
Country Damage on Cotton	30
The Wool Tariff (illustrated)	33
Cotton Investigations	37
Diffusion of Light	42
Circular Electric Loom	48
Mercerizing Apparatus	52
Cotton Department — American Cotton Spinning Machinery—Questions and Answers in Cotton Spinning—Double Lift Machine	56
Woolen Department — Ingenuity in Modern Textiles—Construction of Woven Textures	65
Knitting Department — Knit-Goods Situation—Fashioning on the Circular Rib Knitting Machine—A Customs Decision—Circular Knitting Machines—Machine for Uniting Knit Fabrics	74
Power Department — Mechanical Draft for Steam Boilers—Cylindrical Nuts and Milling Cutters	82
Dyeing Department — Dyeing Recipes 129 to 144—New Dyes—Lustre on Cotton—Indigo	89
Yarn Department	129
Questions and Answers	97
New Publications	100
Industrial News	101
Mill News	104
Personals	108
Situations Wanted	121
Special Advertisements	127
Textile Patents	19
Recent Sales of Mill Shares	104
Textile World's Directory	175

Classified Index for Buyers, - - Page 113.
Alphabetical Index to Advertisements, " 119.

GUILD & LORD, Publishers, 620 Atlantic Avenue, Boston, Mass.

THE SPENCER SAVES OIL, LABOR Geo. S. Harwood & Son, SOLE SELLING AGENTS.

GRANGER FOUNDRY & MACHINE CO.,

PROVIDENCE, R. I.

Bleaching, Dyeing, Drying and Finishing Machinery.

Cotton, Paper and Husk Rolls.

TENTERING MACHINES

With Patent Self-Feeding Clips.

Patent Combination Rolls

—OF—

HUSK AND COTTON.

Calenders, Mangles, Drying Machines, Tentering Machines, Hydraulic Presses, Etc.

—BEETLES—

Short and Long Chain Dyeing, Sizing and Drying Machines.

PATENT

OIL, COMBINED "PLATE and FLAME"

SINGEING MACHINES.

DRYING MACHINERY	DYEING MACHINERY
Tinned Steel and . . . Copper Cylinders of . . . Various Dimensions	*For piece goods and for long and short chain system of warps . . .*

H. W. BUTTERWORTH & SONS

COMPANY,

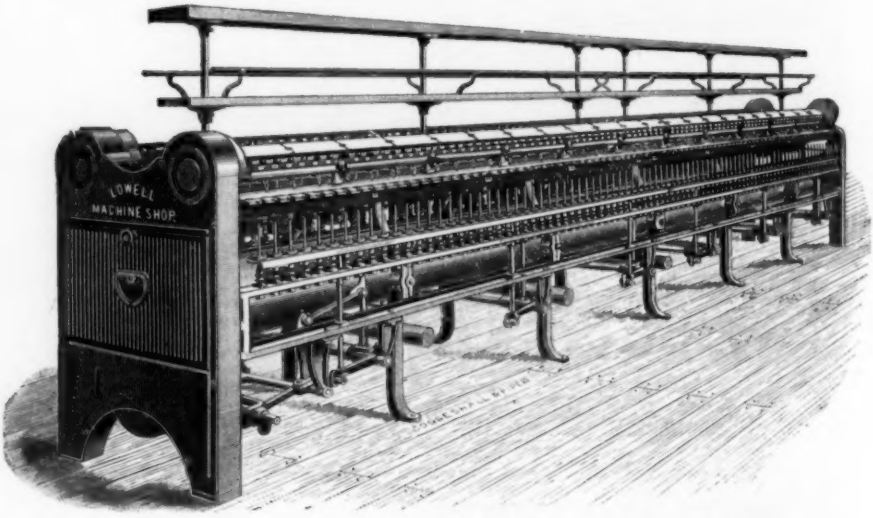
PHILADELPHIA, - PENN.

BLEACHING, PRINTING, DYEING,

DRYING and FINISHING MACHINERY.

Bleaching Machinery	Tentering Machinery
Singeing Machines Kiers . . . Washing Machines Calenders Mangles etc., etc. . . .	*Straight, Return and Vibratory. Latter having patent Adjustable Cam tor vibrating patent Automatic Clamp, etc.*

THE LOWELL RING FRAME.



All parts are made on special tools to standard sizes and are interchangeable.

The greatest care is taken to have the frames constructed so as to obtain the greatest production with the highest speed.

All spindles are run in their bearings before being sent out.

Fluted Rolls are ground to accuracy as to their roundness and diameter, a very important characteristic for high speed.

We supply the best Separator in the market and provide all our frames with traveller clearers, lifting thread board device, cut gearing, improved roving traverse motion, heavy tin drums that don't break down, and all other parts that go with a first-class machine.

Lowell Machine Shop,

LOWELL, MASS.

EIGHTY COTTON MILLS

HAVE NOW ORDERED

Northrop . . Looms

With a Record of 25,000 sold the Skeptics should be thoroughly silenced . . . . .

We are not only selling a machine requiring but one half or less of the usual attention, but one that produces a better, as well as a cheaper, product.

We believe we have called this fact to the attention of the manufacturing public before, but constant reiteration is sometimes necessary with that class of human nature which persistently overlooks its own self-interest.

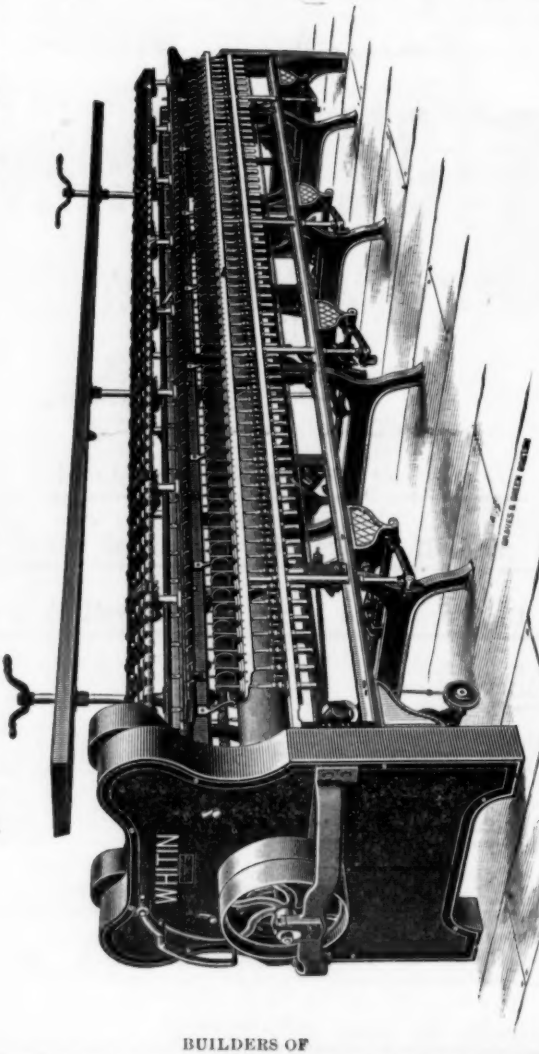
THE DRAPER COMPANY,

HOPEDALE, MASS.

The Whitin Machine Works,

Revolving Flat Carding Engines,
Long Chain Quilling Machines,
Wet and Dry Twisters,
Looms,

Railway Heads,
Drawing Frames,
Reels,
Spoolers.



The New Whitin Ring Spinning Frame.

BUILDERS OF

COTTON MACHINERY,

Whitinsville, Mass.

Southern Office: 38 So. Tryon St., Charlotte, N. C.

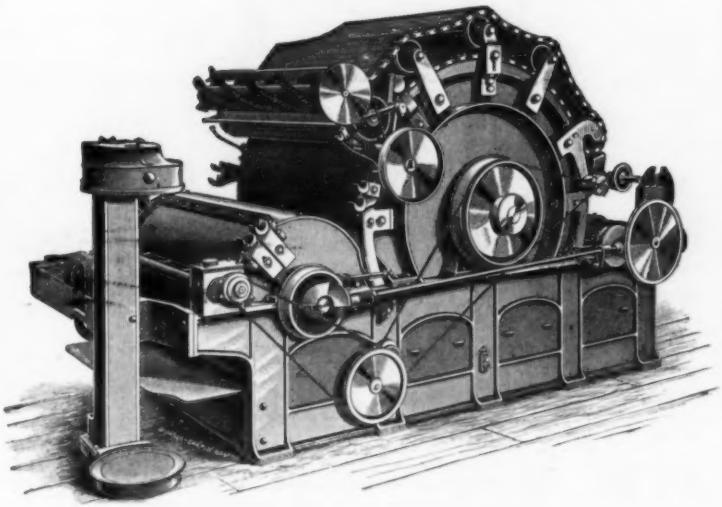
S. W. CRAMER, Southern Agent.

MASON MACHINE WORKS,

TAUNTON, MASS.

COTTON MACHINERY

NEW REVOLVING FLAT CARD.



Cards, Combers, Railway Heads, Drawing Frames, Spinning Frames, Mules and Looms,

INCLUDING THE

Mason-Northrop Loom.

SOUTHERN AGENCY:

D. A. TOMPKINS CO., Charlotte, N. C.

THE FISHER CARD FEED

for WOOL, SHODDY, and COTTON, is

Second to None

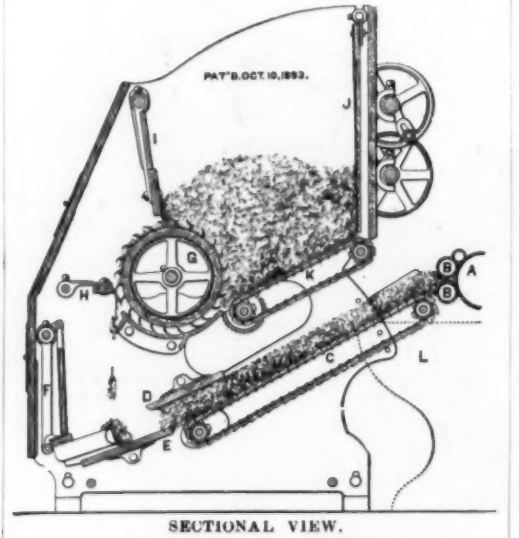
on the market. It holds more stock, requires less space, and needs no "attachments."

WOONSOCKET WORSTED MILLS,
Spinners of Worsted Yarns. Mixes and Fast Colors Specialties.
Boston Office, 370 Atlantic Avenue.

WOONSOCKET, R. I., March 4, 1896.

Messrs. Woonsocket Machine and Press Co., City,

GENTLEMEN—In answer to your inquiry of to day as to how we like the FISHER FEEDS would say that, after running one for three months and having put in four more since, is sufficient evidence that we consider the Fisher Feeds the best in the market to-day, and you are at liberty to bring any interested person into our mill to see them running and judge for themselves. Yours truly, WOONSOCKET WORSTED MILLS,
EDWIN FARNELL, Agent.



SECTIONAL VIEW.

THE FISHER CARD FEED is simple in construction, is strongly built, turns out even work, requires little changing, and feeds the same whether full or nearly empty.
It is built in all sizes and guaranteed as represented.

STAR WORSTED COMPANY,
Worsted Yarns.
C. T. Crocker, Pres. C. B Smith, Treas.

FITCHBURG, MASS, March 4, 1896.

Woonsocket Machine and Press Co.,

GENTLEMEN—We have the pleasure to inform you that the two FISHER CARD FEEDS are working to our entire satisfaction, giving good results on both long and short wools.
Yours respectfully, STAR WORSTED COMPANY,
(Second order.) A. GARTH, Supt.

MANUFACTURED BY

Woonsocket Machine and Press Co.,

WOONSOCKET, R. I.

HOWARD & BULLOUGH

AMERICAN MACHINE COMPANY,

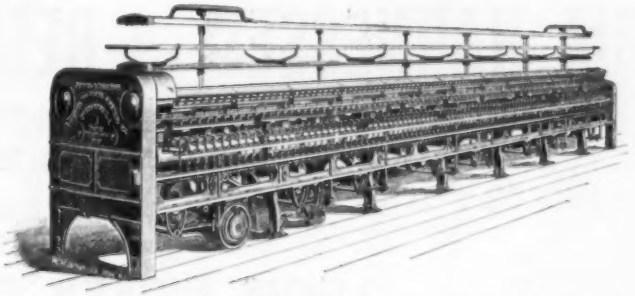
LIMITED.

COTTON MACHINERY.

Pawtucket, R.I.

BALE BREAKERS and LATTICES
FEEDERS
SELF-FEEDING OPENERS
BREAKER LAPPERS
INTERMEDIATE and FINISHER LAPPERS
REVOLVING FLAT CARDS
DRAWING FRAMES With Mechanical or Electric Stop Motion.
SLUBBING FRAMES
INTERMEDIATE FRAMES
ROVING FRAMES

Improved New Pattern Spinning Frames.



This New Pattern Spinning Frame contains many valuable improvements which will certainly interest you and pay you to investigate. All parts are specially designed and so constructed as to obtain the highest speed and greatest production.

We Invite Investigation and Comparison.

WORSTED MACHINERY.

STODDARD, HASERICK, RICHARDS & CO.,

BRADFORD, ENG. BOSTON, MASS.

TAPE PICKER LOOPS,

RAWHIDE AND LEATHER LOOM PICKERS, DUCK AND TICKING LUG STRAPS.

LOOM HARNESSES AND REEDS

BLACK OAK TANNED ENGLISH PICKER LEATHER, NORTH CAROLINA HICKORY PICKER STICKS, ETC.

MANUFACTURED BY THE

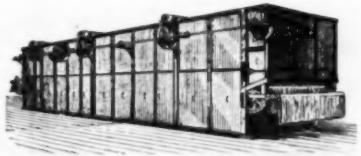
LOOM PICKER CO.,

BIDDEFORD, ME.

Freight and Telegraphic Address, SACO, Me,

Illustrated Catalogue, the most complete of its kind ever issued, on application.

CYCLONE DRYERS



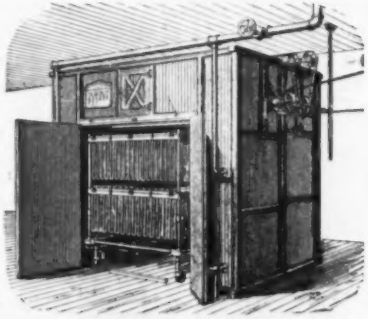
Automatic Yarn Dryer.

For Hosiery, Underwear, Yarn, Cotton Stock, Wool, etc.

CARBONIZING MACHINES,

YARN SCOURING MACHINES,

BREASTS, BURRING MACHINES.



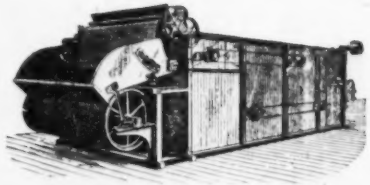
Truck Yarn Dryer.

FEED ROLLS, LICKERS-IN.

Phila. Textile Machinery Co,

Hancock and Somerset Sts.,

PHILADELPHIA, - PENN.



Automatic Cotton Stock Dryer.

GARNETT MACHINES

KILBURN, LINCOLN & CO.,

FALL RIVER, MASS.

MAKERS OF LOOMS FOR COTTON AND SILK WEAVING.

Over 30,000 of new High-Speed Looms are in successful operation in the City of Fall River alone, and weaving all grades of goods. We claim that the mills producing the greatest quantity of goods per day, as well as those producing the finest quality of goods, are using our looms.

The KILBURN-LINCOLN-NORTHROP LOOM is now Ready for the Market.

FAIRMOUNT MACHINE CO

22ND & WOOD STS.
PHILADELPHIA.

THE LATEST AND BEST

LOOMS, DOBBIES, HARNESS MOTIONS

BEAMING SPOOLING WINDING DYEING AND SIZING MACHINERY

POWER TRANSMITTING MACHINERY.
FREIGHT ELEVATORS, PATENT FRICTION CLUTCHES.

WHITINSVILLE SPINNING RING CO.
ESTABLISHED 1873.
WHITINSVILLE, MASS. U.S.A.
OUR PATENTED SPECIALTIES.
DOUBLE RIBBED RINGS U.S. STANDARD. TRAVELER CLEARERS. METALIC BURNISH LIKE THAT PRODUCED BY THE TRAVELER.

ELIJAH ASHWORTH,

MANUFACTURER OF

Card Clothing of Every Description

FALL RIVER, MASS. HENRY ASHWORTH, Agent.

GEORGE FELL & SON,

BOLTON, ENGLAND.

Manufacturers of
Persian, Welsh and Calf **ROLLER SKINS.**

Sole Agents for the U. S., Messrs. Stoddard, Haserick, Richards & Co., Boston.

ANYTHING

Entire Outfits for New Mills, or small and odd items that you don't know just where to obtain, can be found at the

AMERICAN SUPPLY CO.
PROVIDENCE, R. I.

in Mill Supplies.

PLATT BROS. & CO.'S
REVOLVING FLAT CARDING ENGINES,

"1894" pattern with Patent Flexible Bend with slots for direct setting of the flats to the cylinder by the gauge, and McConnell & Higginson's Patent Grinding Apparatus for grinding the flats from their working surfaces.

Sykes' Hardened and Tempered Plow Ground Polished Steel Wire Card Clothing.
EVAN ARTHUR LEIGH, Successor to E. A. Leigh & Co., (Sole Agent),
35 and 36 MASON BUILDING, BOSTON.

Cohoes Foundry and Machine Co.
BUILDERS OF
SLASHERS,
ELEVATORS,
WATER WHEEL GOVERNORS, SHELL ROLLS.
General Foundry and Machine Work, Repairing
COHOES, NEW YORK.

JACOB WALDER, - Paterson, N. J.
Sole Manufacturer in United States of
BRASS AND STEEL MAILS
Liberal Discount to Dealers.

ESTABLISHED 1865.
W. W. ALTEMUS & SON,
Patent Bobbin and Cop Winders, Spoolers, Beamers, Warp Mills, Chenille Cutting, Carpet Rolling Machines, Reels, Etc.
2816 N. 4th Street, - PHILADELPHIA, PA

WATSON'S
HEDDLE FRAMES.
WIRE HEDDLES.
TEMPERED STEEL WIRE
STRIPPER CARDS.
ADDRESS L. S. WATSON MFG. CO., LEICESTER, MASS.. FOR THE VERY BEST MADE

SPINDLES

For Cotton, Woolen, Worsted, Silk, and Flax Machinery.

MANUFACTURERS AND REPAIRERS.

Also FLYERS, STEEL CAPS, BOLSTERS, STEPS, TUBES, Etc.

WARD & VANDEGRIFT,

Formerly with Bridesburg Mfg. Co.

Elmer, Salem Co., N. J.

ELLIOT CLOTH FOLDER AND MEASURER

For Cotton and Gingham Mills, Bleacheries, Print Works, Etc.

MANUFACTURED BY

ELLIOT & HALL,

54 1-2 Hermon St., Worcester, Mass. Send for Circular.

THOMAS TOWNSEND,

Rhode Island Comb Works, Mfr. of

Machine Wool Combs

Cotton Combs Neatly Re-Needled

Hackles, Gills, Fallers and Porcupines. Tentering Tin Plates. Dealer in the best English and American Cast Steel Pins and Comber Needles.

All Work Guaranteed. 157 Orange St., Providence, R. I.

Douglas Mfg. Co.

BOX 249, FALL RIVER, MASS.

Ring Travelers, Pickers, Belting, Etc.

Paper Tubes, Cones and Parallels.

Quotations and estimates cheerfully furnished.

Mill Supplies.

Lowest prices without detracting from the quality. All we ask is for requests for special prices.

Nashua Spool and Bobbin Co.,

NASHUA, N. H.

Manufacturers of BOBBINS, SKEWERS, SPOOLS AND SHUTTLES of every description.

COMB CIRCLES

Fallers and Gills,

and all kinds of GILL COMB and CARD PINS, and PICKER TEETH.

PRICES REDUCED.

WILLIAM CRABB & CO., Newark, N. J.

"COLUMBIA" SIZING.

"Columbia" Sizing Preparation gives the best results every time. 4 to 6 lbs. of "Columbia" Sizing will do as much and far better service than 20 lbs. of the others. This sounds big, but try a sample order and see for yourself.

COLUMBIA MFG. CO.,

143 to 151 Pocasset St., Fall River, Mass.

R. D. DOUGLAS, Mgr.

Established 1844.

BENJ. BUCKLEY'S SON,

(Wm. J. Buckley)

GUN MILL, PATTERSON, N. J.

Manufacturer of all kinds of

SPINDLES, FLYERS, RINGS, TUBES, CAPS, &C.

FOR

Cotton, Silk, Flax, Woolen and Worsted

MACHINERY.

Roving Spindles and Flyers a Specialty. Light Forgings. Repairing of all kinds.

ELEVATORS. Hoists, Waiters for any place, capacity or weight, Electric, Steam, Hydraulic or Manual Motors, Shafting, Pumps, Boilers, Pipe, Rope, Drug and Paint Mills, Presses, Gearing, Mining and Coining Machinery, Street and Road Making and Sweeping Machinery.

GEO. C. HOWARD, 1783 Barker St., Phila., Pa.

ECO Magneto ELECTRIC

WATCHMAN'S CLOCK.

Write for Circular

Eco Magneto Clock Co.,

620 Atlantic Ave., BOSTON, MASS.

Carbonizing and Scouring.

A specialty with us is the Carbonizing **Fine Stock**, including **Australian, Cape and South American Wools, Noils, etc.**

Kennebec Woolen Mills,

JOHN LUNN, Proprietor.

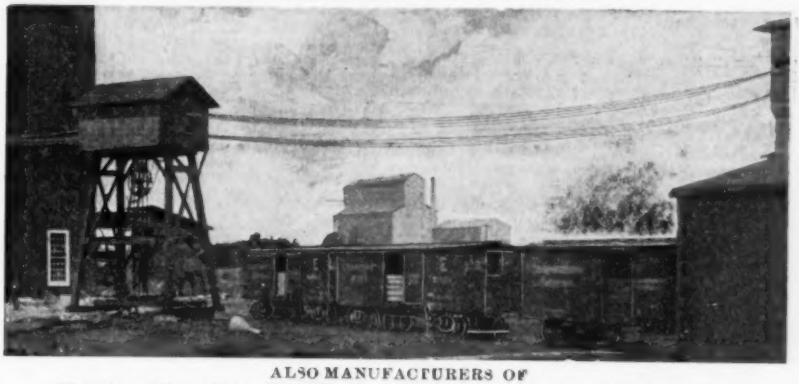
2025 Naudain St.,

PHILADELPHIA, PA.

THE WORLD'S STANDARD
A COMMENCEMENT GIFT
that will be an hourly and perpetual reminder of the donor and the occasion—that will last to become an heirloom to future generations
A Full Ruby Jeweled
ELGIN WATCH.
Its endurance and accuracy come from its perfected construction—hardened steel pivots acting on genuine, polished rubies—an efficient time-keeper—a welcome gift.
At all Jewelers, in various sizes, and in cases offering hundreds of patterns of various ornamentation for your selection—either open face or hunting case—Arabic or Roman dials—prices invariably reasonable.
An Elgin watch always has the word "Elgin" engraved on the works—fully guaranteed.

MANILA ROPE POWER TRANSMISSIONS

Designed and erected to suit existing conditions and available space, employing "Link Belt" Sheaves, with **Patent Machine Moulded Grooves,** insuring absolute uniformity, and presenting the highest mechanical development in Rope Drive operation.



ALSO MANUFACTURERS OF

Shafting, Shaft Bearings, Pulleys, Bearing, Friction Clutches, Etc.

CATALOGUE MAILED.

Parties contemp'ating enlarging their plants will do well to secure our prices.

THE LINK-BELT MACHINERY COMPANY,

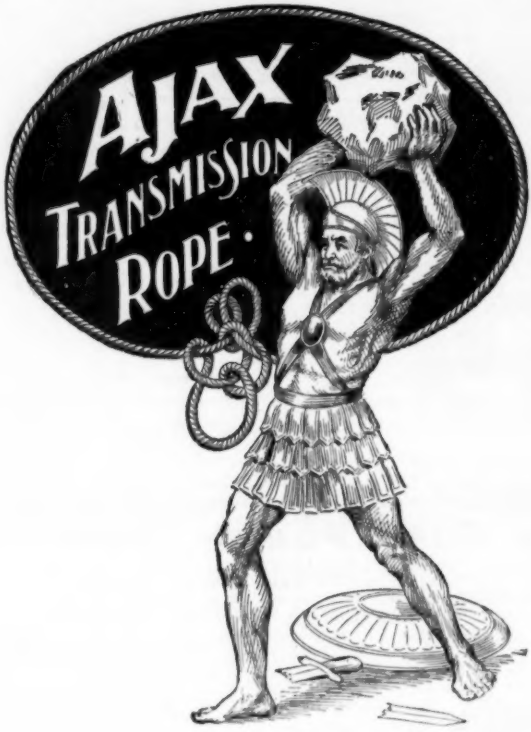
Southern Department,
710 Union St., NEW ORLEANS, LA. - - **CHICAGO, U. S. A.**

ENGINEERS, FOUNDERS, MACHINISTS.

LINK-BELT ENGINEERING CO., Phila. & New York.

The Standard of all Transmission Ropes.

Has been Tested by the Largest Users in the Country.



AJAX runs the longest and largest drive in the world at Pensacola, Florida.

AJAX drives the new mammoth grain elevator, in Manchester, England.

AJAX drives the great machinery of the Illinois Steel Company.

USE AJAX AND RUN NO RISK OF ACCIDENT.

H. CHANNON COMPANY,

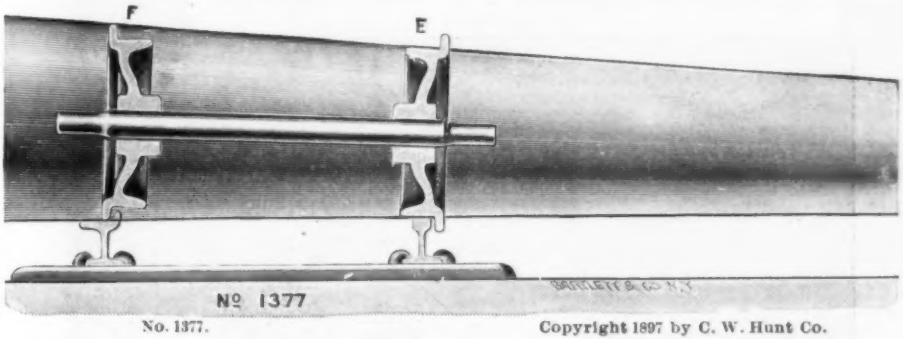
24 and 26 Market Street, Chicago.

Industrial Railways.

No. 1288.

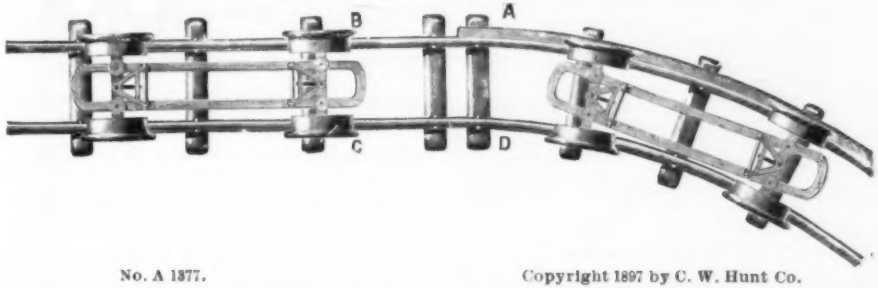
No. 1288. Copyright 1897 by C. W. Hunt Co.

For the purposes for which this system of railway is designed a narrow gauge is an absolute necessity. As to the exact gauge that shall be used opinions may differ, but from the experience gained in building and using railways of this character for many years, we believe that, if our guage is not the ideal one, it is very near it. In all of the railways that we have built we have never had a user of them even suggest that a broader gauge would be better for any purpose. Our standard guage is 21½ inches measured from the outside to the outside of the heads of the rails.



No. 1377. Copyright 1897 by C. W. Hunt Co.

Our cars have a flexible wheel base, the axles taking a radial position the wheels and the curve so proportioned that there is no slipping whatever to cause friction. The principle on which these cars turn a curve is illustrated in cuts Nos. A 1377 and 1377. A cylinder rolls on a plane in a straight line without sliding friction; a cone also rolls on a plane in a circle, about its vertex, without sliding friction. If both of the wheels of a car running on a curve have the same diameter as the cone would have at each rail, they are portions of the cone, and the wheels would run around the curve without sliding friction, the axles taking a radial position. The illustration, No. 1377, clearly shows that, if correctly made, there is no sliding friction in passing the curve.



No. A 1377. Copyright 1897 by C. W. Hunt Co.

A new Catalogue No. 9805 has been issued covering this subject thoroughly and embodying all new features. It is sent free to those interested by addressing the works direct.

C. W. HUNT COMPANY, Bard Ave., Staten Island, N. Y.

Reform should begin with..... the Bale.

Every cotton manufacturer recognizes the very great importance of an improved system of baling, but he may fail to appreciate how he can help the reform movement. He thinks he must take his cotton in any shape it comes to him. This may be true for a time, until the planter is brought to see that the manufacturer's interests are identical with his. Let every manufacturer, when buying, emphatically state his preference for such a bale as the Lowry press makes, and a tremendously powerful influence is created which cannot fail to expedite the desired end.

Other efforts along this line, in the way of a round bale, have met with only meager success because the presses were complicated and expensive and the plans adopted savored too much of monopoly.

The Lowry press is so simple and comparatively inexpensive that every gin in the South can have one. It is not to be controlled by a syndicate, but every planter may buy it. There need be no revolution in the methods of the cotton trade to introduce the Lowry bale, which possesses such manifest advantages that every one who saw it at the spring meeting of the New England Cotton Manufacturers most heartily approved of it.

THE LOWRY COTTON BALE.

The bale on end is the Lowry bale with the covering on. The bale on its side is the Lowry bale with the covering off, but the wires uncut. The long caterpillar coil is the Lowry bale after the wires are cut.

It opens spontaneously upon cutting the binding wires, and contains no felted or matted cotton, and almost no tare.

This press and bale can and will be brought into general use, and offer the only practical means towards the reform of the slipshod American system of baling. The saving in freight, insurance, tare, and condition of stock presents an unanswerable argument, about which cotton manufacturers can have but one opinion. Therefore let that opinion be known whenever opportunity presents itself. Ask for the Lowry bale.

Any who are interested in learning more about it and the press are invited to address the

PLANTERS' COMPRESS CO.,

89 State St., Boston, Mass.

STEPHEN M. WELD, President.

Laminar Fibre Co.,

COLIN C. BELL, Pres. & Treas.

MANUFACTURER OF

ROVING CANS, BOXES, TRUCKS,

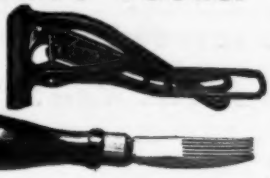
Insulating Material, Sheets, Tubes and Manufactured Articles.

OFFICE AND FACTORY, TANNERY ST., NORTH CAMBRIDGE, MASS.

L. D. Tel. Arlington 44.

CARDER'S TOOLS.

LEWIS' PATENT CARD CLAMPS.



Gardner & Reid's Card Tooth Raiser.

For Setting Up Bent Teeth of Card Clothing, with a variety of other tools used by Carders and Manufacturers. Send for circular.

W. H. BROWN,

No. 81 Mechanic St., WORCESTER, MASS

W. A. JONES

Foundry and Machine Co.

53-59 South Jefferson St., CHICAGO.

Shafting, Pulleys, Gearing, Friction Clutches, Rope Sheaves, Bearings, etc. Send for Catalogue. Orders filled promptly from stock.

FINISHING MACHINERY for Brushing, Calendering, Drying, Dyeing, Fulling, Lapping, Rolling, Folding, Measuring, Pressing, Steaming, Shearing, Singeing. Blades, Spirals, Brushes furnished or repaired; Wire Looms, Forming Press for Febrille Goods, Metals or Hats. Perforating, Plate Printing, Engraving Machines. Paper Mill, Box Printers and Binders Machines. GEO. C. HOWARD, 1783 Barker St., Phila., Pa.

GUSTAVE P. FRESNEL,

Agent for the Best Designers in LYONS and PARIS.

Latest French novelties in sketches for Printed Cotton Goods, Printed Silk, Broad Silks and all kinds of textile fabrics.

125 West 56th St., New York.

SAFE AND RELIABLE.

EMPLOYERS' LIABILITY INSURANCE

—AT—

Conservative Rates.

SAM'L APPLETON,

28 Central Street, Boston, General Agent.

IF YOU USE CUTS

HAVE THEM ELECTROTYPED BY

Hahn's Latest Improved **Watchman's Time Detector.**

This clock is adapted to 6, 12 or 18 stations and the keys are all different A liberal allowance made for old detectors. For circulars, prices and further information address,

NANZ & CO.,

116A Chambers Street, New York.

Wm. Pickhardt & Kuttroff

New York, - - 128 Duane St.
Boston, - - - 60 Pearl St.
Providence, - - 80 So. Water St.
Philadelphia, - 207 Chestnut St.
Chicago, - - - 207 Michigan St.

Importers of Indigo

PATENTS

CROSBY & GREGORY
34 SCHOOL STREET.

Telephone 3593, Boston. **Office Established 1854.** Cable address Aniline.

George W. Gregory, in November, 1874, resigned his position as Principal Examiner U. Patent Office to enter the firm.

Patents secured in the United States and all other countries, Reissues obtained. Interferences conducted. Suits brought and defended for infringement, and searches made as to the validity of patents. Prepared to give special and expert attention to cases involving knowledge of cotton, wool, leather and metal working machinery, including boots and shoes and electrical, chemical and metallurgical inventions and steam engineering Correspondence solicited. No charge for preliminary advice. Personal consultation best when possible.

HOPEDALE, Mass., January 2d, 1893.

Mr. George W. Gregory, of Crosby and Gregory, has taken out for us since January, 1875, more than two hundred patents. GEO. DRAPER & SONS.

PATENTS

Wright, Brown & Quinby,

Exchange Building, 53 State St., Boston.

Washington Loan & Trust Bldg., Washington, D.C.

Patent Causes, Patents, Copyrights, Trademarks.

Experts in all matters connected with the manufacture of Textile Fabrics, Sewing Machines, and Electricity

Patents

BENJAMIN PHILLIPS. T. HART ANDERSON

PHILLIPS & ANDERSON,

Attorneys-at-Law and Solicitors in Patent Causes,

Exchange Bldg., 53 State St., Boston, Mass.

Mr. Van Everen, of our office, was for a number of years an Examiner in the U. S. Patent Office, in the Division of Textiles.

Patents—Corporation Law—Bankruptcy.

We devote ourselves to the above specialties because we believe that they naturally belong together A thorough knowledge of patent law is today a practical necessity for one acting as legal adviser to a manufacturing or trading corporation The new national bankruptcy act, on account of the scope of its operation and the moderate fees, will be largely resorted to, and will be of much importance to such corporations.

It is our practice to visit the plants of our clients from time to time that we may keep them advised as to the possibility of protecting improvements, such as are often allowed to become public property simply because the grounds of their patentability are not commonly understood. We invite correspondence and interview.

CROSSLEY & GODDARD, Patent and Corporation Lawyers, and Solicitors of Patents. Adams Building, 23 Court St., Boston.

List of Textile Patents.

Issued July 26 and August 2, 9 and 16, 1898.

Specifications and drawings furnished for ten cents each Address W. S. Gavey, P. O. Box 222, Brooklyn, N. Y.

Bale Covering, Metallic. 608,042. Mark A. Heath, Providence, R. I., assignor to the American Cotton Bale Co., same place.

Bales, Apparatus for Unwinding Cylindrical Cotton. 608,399 Anadore B. Bosca, and Ernest W. Venner, Lowell, Mass.

Cards for use in Jacquard Machines. Apparatus for Preparing. 608,473. Robert G. McCrum, Armagh, Ireland.

Cloth Inspecting Machine. 608,468. Edwin T. Marble and Edwin H. Marble, Worcester, Mass.

Cloth Measuring Machine. 608,818. John E. Windle, Worcester, Mass.

Cloth Ornamenting Apparatus 609,190 John Lancaster and Charles Witteck, New York, N. Y.

Cloth Shearing Machine. 609,166. Charles E. Richardson, Springfield, Vt., assignor to the Parks & Woolson Machine Co., same place.

Holland and Colonies.

Patents. Trade Marks.

H. Massink, L. D. at Amsterdam.

Cloth Winding Machine. 608,817. John E. Windle, Worcester, Mass.

Cotton Gin. 608,729. Magnus Swenson, Chicago, Ill., assignor to the American Cotton Co., New York, N. Y.

Cotton Press. 608,667. John W. Graves, Little Rock, Ark , assignor to the American Cotton Co., New York, N. Y.

Cotton Press. 608,668, John W. Graves, Little Rock, Ark., assignor to the American Cotton Co., New York, N. Y.

Cotton Press. 608,669. John W. Graves, Little Rock, Ark., assignor to the American Cotton Co., New York, N. Y.

Cotton Press. 608,982. John W. Graves, Little Rock, Ark.

Dye. Blue Black Azo. 608,999 Johann Sammann, and Moritz Ulrich, Elberfeld, Germany, assignors to the Farbe fabriken, vormals Fr. Bayer & Co., same place.

Dye. Brown Azo. 608,024. Melchior

(Continued on next page)

M. A. FURBUSH & SON MACHINE CO.

OUR LINE INCLUDES MODERN TYPES OF

Wool Pickers
Cards for all kinds of Wool
Cards for Worsted
Cards for Shoody
Cards for Cotton Batts
Breakers
Condensers
Blamire Lap Machines
Balling Heads for Worsted Cards
Knickerbocker Attachments for Cards
Reballing Machines for Worsted
Vibrators for Ring Doffers
Fillet Winders
Grinders
Card Stretchers
Rubbing Motions
Spooler and Creels for Side Drawing Bobbins
Self-Acting Mules
Hand Jacks
Jack Bobbin Winders
Beamers
Doffer Combs
Creels
Twisters
Heck Stands
Universal Sectional Warp Mills
Warp Dressers
Dresser Spoolers
Looms for Carpets, Smyrna Rugs, Rug Weft
Blankets, Table Covers
Paper-Makers' Felt, Narrow Woolens
Teasel Gigs
Card Clothing
Looping Attachment to Twister
Murkland High-Speed Ingrain Carpet Loom
Heddle Frames

SEND FOR OUR ILLUSTRATED CATALOGUE OF

WOOLEN MACHINERY.

224 MARKET STREET, - PHILADELPHIA.

Boniger, Basle, Switzerland, assignor to Chemische Fabrik, vormals Sandoz, same place.

Dye. Brown Black Sulphur. 608,355. Henri R. Vidal, Paris, France.

Dye. Green Alizarin. 608,238. Karl Thun, Barmen, Germany, assignor to the Farbenfabriken of Elberfeld Co. of New York.

Dyeing. Apparatus for. 607,834. Cesar Corron, Lyons, France.

Dyes. Process of Making Violet. 608,354. Henri R. Vidal, Paris, France.

Fibre-Treating Machine. 607,833. Joseph Choquette, St. Hyacinthe, Que., assignor of two-thirds to Moritz Bros., same place, and William A. Torrance, Harrison, N. J.

Fibrous Materials Feeding Apparatus for Machinery for Preparing. 608,981. John Good, New York, N. Y., assignor to Julia E. Good, same place.

Hackling Machine. 608,979. John Good, New York, N. Y., assignor to Julia E. Good, same place.

(Continued on page 126.)

ASBESTOS ROOFING.

FIRE PROOF, STRONG, LIGHT,
PERMANENTLY FLEXIBLE,
EASILY APPLIED.

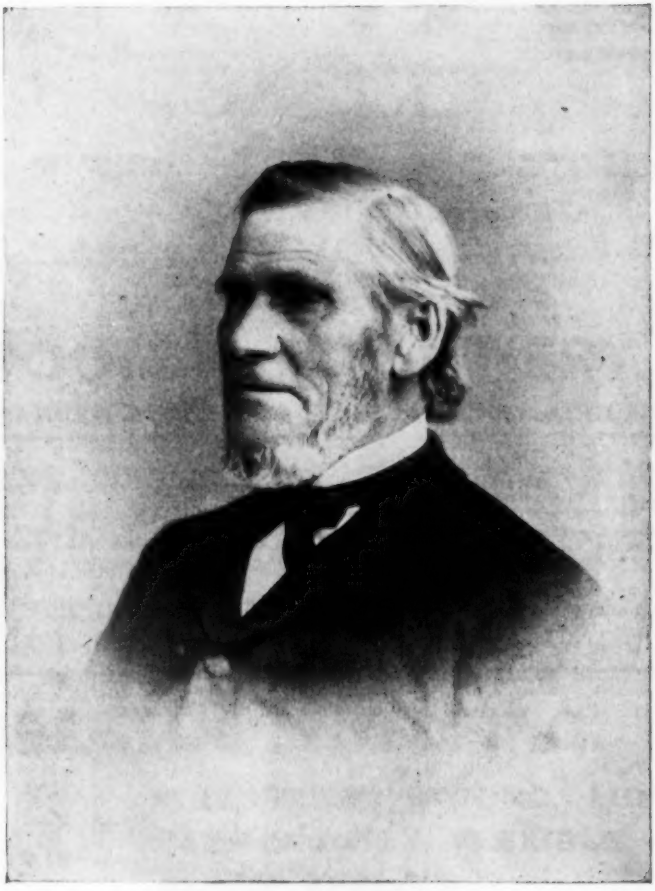
These words describe briefly our line of **ROOFING** and **FELTS**. We have a variety of styles and prices.

We also make **SECTIONAL** coverings. Our **FIRE-FELT** style stands pre-eminent. Nothing so good marketed. Full particulars at your request.

H. W. JOHNS MFG. CO.,

100 William Street, - - - - - - NEW YORK.

CHICAGO. PHILADELPHIA. BOSTON. DETROIT. COLUMBUS. PITTSBURG.



ALBERT CURTIS.

TEXTILE WORLD.

Vol. XV. SEPTEMBER, 1898. No. 3.

ALBERT CURTIS.

Albert Curtis, president and treasurer of the Curtis Manufacturing Co., Worcester, Mass., died July 27, last, at his home in Worcester, at the age of 91.

Mr. Curtis was born in Worcester, Mass., July 13, 1807. He was a son of Samuel and Eunice Taft Curtis, being one of the fourth generation from Ephriam Curtis, who came to Worcester from Sudbury in 1673, and who was one of the first settlers in Worcester. He was of a large family of children, and was early bereaved of his father. Before he reached his 10th year he was obliged to a great extent, to provide his own living. He resided for a time with his uncle in Auburn, and later with an elder brother in Tioga County, N. Y., doing what he was able to do at farm labor. He returned to Worcester at the age of 17, robust in health and filled with a laudable ambition to better his condition, and that of those who might need his support.

He went into the service of White & Boyden, manufacturers of woolen machinery, at South Worcester, and remained with them as apprentice and journeyman several years. After learning his trade he worked here three years as a journeyman at $1.25 a day. In December, 1829, he went to Pittsburg, but returned in January, 1831, and again entered the employment of White & Boyden. While learning his trade he became acquainted with his fellow workmen, Abel Kimball and John Simmons, and they conceived the idea of going to New Worcester and starting for themselves. August 7, 1831, the three entered into a copartnership under the firm name of John Simmons & Co., and opened a shop at New Worcester, where they manufactured broad and narrow shearing machines, pressing machines and napping machines. The partnership was dissolved Feb. 21, 1832, and was succeeded by Simmons & Curtis, who continued to make shearing and other machinery suitable for use in various departments of cloth making. In 1833 Mr. Curtis purchased Mr. Simmons' interest, and continued alone until 1834, when William Henshaw became a partner, and so continued until 1839, the firm being Curtis & Henshaw. This copartnership was dissolved Jan. 8, 1839.

About 1840, Mr. Curtis purchased a water privilege, the building and satinet machinery, consisting of two full sets.

In 1842, he built a factory, a portion of which he leased to Sumner Pratt to make cotton sewing thread. Mr. Curtis afterward had an equal interest with Mr. Pratt, and bought his out in 1844, and put in looms for making cotton sheetings. The mill was continued as a cotton mill for several years, when it was converted into a satinet mill.

In 1852, Mr. Curtis bought the Trowbridgeville factory and commenced there the manufacture of cotton sheetings. In 1860, the mill was burned, and partially rebuilt, and filled with machinery for making woolen goods. Mr. Curtis changed the 1845 mill to woolen goods in 1871, and has since put in additional machinery for the manufacture of horse blankets. The mill built in 1842 was changed to satinets in 1857.

In 1862, Mr. Curtis took Edwin T. Marble into partnership in his business for manufacturing woolen machinery for finishing woolen, silk, and

cotton goods, and that partnership continued until May 22, 1895, when Mr. Curtis retired. Mr. Marble continues under the old firm name.

Early in 1875, Curtis & Marble purchased and removed to Worcester all the patterns, special tools and stock of C. L. Goddard's wool burring machine works of New York City.

Mr. Curtis built the first machines for shearing or trimming cotton cloth, built in this country, they being used to remove the fuzz from cotton cloth. A shearing machine made in France was sent from Pawtucket to Mr. Curtis to be repaired. Mr. Curtis examined it and thought it could be improved. He began building the machines then and continued to the time he retired from business. Up to that time the French machines had been used in this country. They had one set of shears; the Curtis machines have from two to five sets. One machine made at the present day will do as much as 12 did in 1830.

Mr. Curtis' business broadened with success, taking in the manufacture of cloth itself. He was soon the owner of extensive mill property. His early knowledge of machinery stood him in good stead in the various branches of his extensive business. Twice during his business career he suffered largely by destructive fires, but nothing daunted by untoward vicissitudes, he immediately set about repairing and rebuilding. Possessed of but a limited education, his taste for reading in early years was a strong help in his later acquirements. He obtained a good knowledge of books, and pursued his studies in various departments of intellectual culture. Particularly was he interested in historical and antiquarian researches. He was a vice-president of the society of antiquity and an efficient member of several other like institutions.

He was also for many years interested in agricultural pursuits. He devoted his time to business rather than to politics, but as early as 1840, he was a selectman of the town of Worcester, serving two years. He was a member of the common council the first year of the infant city, and alderman in 1857. Mr. Curtis was an unswerving member of the Republican party.

Mr. Curtis was a life member of the Worcester County Mechanics Association, and one of the original charter members. He was on the board of directors and a member of the board of trustees in 1842. He was a director again in 1854, and on the committee on building that year.

He was a member of the board of trade, and Worcester Agricultural Society, and for many years was president of the home for aged men, and latterly a trustee.

For 30 years he was superintendent of Hope cemetery and chairman of the commission, having been re-elected two years ago to that office for five years.

He was president of the Jaques fund and other funds of the city hospital.

He was a liberal giver to charitable institutions during his life, and a few of his gifts include $25,000 to the Y. M. C. A., for which Curtis Hall was called after him; $5000 to the Y. W. C. A., and $25,000 for building the new Union church. He gave an organ to the Congregational Church of Sterling, a piano to Bethany Church, and contributed $100 toward the new organ of Auburn Church, and also $100 when the church was being built.

January 31, 1891, Mr. Curtis presented Curtis Chapel in Hope Cemetery to the city. It cost $16,000.

He has given books and instruments to the city hospital. He was instrumental in establishing a home for aged men, and he and the Knowles heirs gave land for a new home for aged women. He has also educated a number of young people, and has spent many dollars for charity that no one knows anything about.

He gave several large contributions to Doane and other small colleges in the West, and for a number of years gave $1000 a year to Moody's school at Northfield.

With the exception of a short stay in Pennsylvania, he lived all his lifetime in his native city.

Mr. Curtis was married twice. His first wife was Mrs. Sally (Houghton) Griffin of Sterling, to whom he was married in October, 1833. His second wife was Rosella P. (Perrin) Bancroft, widow of Rev. David Bancroft, formerly of Tolland, Ct. They had no children, and she died April 16, 1896.

His life has been a long and well-spent one, and no deserving cause was ever presented to him without receiving practical aid. His gifts during life, aggregated $500,000. He left an estate of $500,000, of which some $450,000 goes to charitable and church work.

The business of the Curtis Manufacturing Co., will be continued by those who have had the active management for some time.

Textile World

WITH WHICH IS INCORPORATED THE

INDUSTRIAL RECORD,

COMBINING

THE AMERICAN TEXTILE, THE DESIGNER AND WEAVER, WARP AND WEFT, THE WOOLEN MANUFACTURER

AND THE

BOSTON TEXTILE.

An Illustrated Monthly Magazine representing the Textile Industries of the United States.

GUILD & LORD, } HENRY G. LORD. BERTRAM LORD.
Proprietors and Publishers.

HENRY G. KITTREDGE, Editor.

PUBLICATION AND HEAD OFFICES:

BOSTON: - 620 ATLANTIC AVE.

PHILADELPHIA OFFICE,
THE BOURSE.

NEW YORK OFFICE,
140 Nassau Street.

Subscription Price.

$1.00 per year for U. S. and Canada.
2.50 per year for Foreign Countries.
3.00 per year with Dyer's Supplement.
(Postage is prepaid by publisher.)

Remit by Express Money Order, Draft, Post Office Order or Registered Letter.

Entered at the Boston, Mass., Post Office as second-class matter.

Every paid up Subscriber will hereafter receive without extra charge

THE TEXTILE WORLD'S COMPLETE DIRECTORY OF THE TRADE.

(1400 pages with 19 maps)

Containing full information about all

COTTON MILLS, WOOLEN MILLS, KNITTING MILLS, SILK MILLS, DYE WORKS, PRINT WORKS, BLEACHERIES,

also lists of

Dry Goods Commission Merchants,
Dealers in Raw Materials,
Manufacturing Clothiers,
Suit and Cloak Makers,
Jobbers and Large Retailers,
Buyers from First Hands.

Special quarterly issues are published in January, April, July and October; one (January) being a statistical issue, and the others devoted especially to the cotton, knitting and woolen branches, respectively.

OUR FOREIGN COMMERCE.

The statistics of the commerce of the United States for 1897-98 have been published, and it is noted that for this period the value of exports reached $1,210,292,097, over seventy per cent. of which consisted of argricultural products, and twenty-four per cent. of manufactures. The value of imports for this period amounted to $616,005,159, upon which there were collected $149,819,594 in duties. It will thus be seen that the value of our exports were nearly twice as much as the value of our imports. During this period, a large amount of gold was imported, to which is due, very largely, the plethoric state of the money market that we have been experiencing.

We imported about the same quantity of foreign cotton during 1897-98 as we did the preceding year, i. e., about fifty-two million pounds, at an average value of 9.47 cents a pound. Over sixty-five per cent. of the imports came directly from Egypt. More than this proportion of Egyptian cotton, however, was received by our mills, a considerable quantity reaching us from British markets.

We imported a less value of manufactures of cotton in 1898, compared with 1897, though the value of the imports of laces, edgings, embroideries, etc., was about the same. The value of the imports of manufactures of cotton for 1897-98 was a little over thirty-eight million dollars, including duties, which was about 13½ per cent. of the estimated consumption of cotton goods in this country. We arrive at this by reckoning the value of cotton manufactures in the United States at $260,000,000, from which we subtract $17,000,000 as the value of goods exported, leaving the home consumption of the domestic article at $243,000,000. We add $38,000,000 as the value of imports, as above, making the gross value of consumption $281,000,000.

In this connection, it is noted that about sixty per cent. of the quantity

cotton goods, and that partnership continued until May 22, 1895, when Mr. Curtis retired. Mr. Marble continues under the old firm name.

Early in 1875, Curtis & Marble purchased and removed to Worcester all the patterns, special tools and stock of C. L. Goddard's wool burring machine works of New York City.

Mr. Curtis built the first machines for shearing or trimming cotton cloth, built in this country, they being used to remove the fuzz from cotton cloth. A shearing machine made in France was sent from Pawtucket to Mr. Curtis to be repaired. Mr. Curtis examined it and thought it could be improved. He began building the machines then and continued to the time he retired from business. Up to that time the French machines had been used in this country. They had one set of shears; the Curtis machines have from two to five sets. One machine made at the present day will do as much as 12 did in 1830.

Mr. Curtis' business broadened with success, taking in the manufacture of cloth itself. He was soon the owner of extensive mill property. His early knowledge of machinery stood him in good stead in the various branches of his extensive business. Twice during his business career he suffered largely by destructive fires, but nothing daunted by untoward vicissitudes, he immediately set about repairing and rebuilding. Possessed of but a limited education, his taste for reading in early years was a strong help in his later acquirements. He obtained a good knowledge of books, and pursued his studies in various departments of intellectual culture. Particularly was he interested in historical and antiquarian researches. He was a vice-president of the society of antiquity and an efficient member of several other like institutions.

He was also for many years interested in agricultural pursuits. He devoted his time to business rather than to politics, but as early as 1840, he was a selectman of the town of Worcester, serving two years. He was a member of the common council the first year of the infant city, and alderman in 1857. Mr. Curtis was an unswerving member of the Republican party.

Mr. Curtis was a life member of the Worcester County Mechanics Association, and one of the original charter members. He was on the board of directors and a member of the board of trustees in 1842. He was a director again in 1854, and on the committee on building that year.

He was a member of the board of trade, and Worcester Agricultural Society, and for many years was president of the home for aged men, and latterly a trustee.

For 30 years he was superintendent of Hope cemetery and chairman of the commission, having been re-elected two years ago to that office for five years.

He was president of the Jaques fund and other funds of the city hospital.

He was a liberal giver to charitable institutions during his life, and a few of his gifts include $25,000 to the Y. M. C. A., for which Curtis Hall was called after him; $5000 to the Y. W. C. A., and $25,000 for building the new Union church. He gave an organ to the Congregational Church of Sterling, a piano to Bethany Church, and contributed $100 toward the new organ of Auburn Church, and also $100 when the church was being built.

January 31, 1891, Mr. Curtis presented Curtis Chapel in Hope Cemetery to the city. It cost $16,000.

He has given books and instruments to the city hospital. He was instrumental in establishing a home for aged men, and he and the Knowles heirs gave land for a new home for aged women. He has also educated a number of young people, and has spent many dollars for charity that no one knows anything about.

He gave several large contributions to Doane and other small colleges in the West, and for a number of years gave $1000 a year to Moody's school at Northfield.

With the exception of a short stay in Pennsylvania, he lived all his lifetime in his native city.

Mr. Curtis was married twice. His first wife was Mrs. Sally (Houghton) Griffin of Sterling, to whom he was married in October, 1833. His second wife was Rosella P. (Perrin) Bancroft, widow of Rev. David Bancroft, formerly of Tolland, Ct. They had no children, and she died April 16, 1896.

His life has been a long and well-spent one, and no deserving cause was ever presented to him without receiving practical aid. His gifts during life, aggregated $500,000. He left an estate of $500,000, of which some $450,000 goes to charitable and church work.

The business of the Curtis Manufacturing Co., will be continued by those who have had the active management for some time.

Textile World

WITH WHICH IS INCORPORATED THE

INDUSTRIAL RECORD,

COMBINING

THE AMERICAN TEXTILE, THE DESIGNER AND WEAVER, WARP AND WEFT, THE WOOLEN MANUFACTURER

AND THE

BOSTON TEXTILE.

An Illustrated Monthly Magazine representing the Textile Industries of the United States.

GUILD & LORD, } HENRY G. LORD. BERTRAM LORD.
Proprietors and Publishers.

HENRY G. KITTREDGE, Editor.

PUBLICATION AND HEAD OFFICES:

BOSTON: - 620 ATLANTIC AVE.

PHILADELPHIA OFFICE,
THE BOURSE.

NEW YORK OFFICE,
140 Nassau Street.

Subscription Price.

$3.00 per year for U. S. and Canada.
2.50 per year for Foreign Countries.
3.00 per year with Dyer's Supplement.
(Postage is prepaid by publisher.)

Remit by Express Money Order, Draft, Post Office Order or Registered Letter.

Entered at the Boston, Mass., Post Office as second-class matter.

Every paid up Subscriber will hereafter receive without extra charge

THE TEXTILE WORLD'S COMPLETE DIRECTORY OF THE TRADE.

(400 pages with 19 maps)

Containing full information about all

COTTON MILLS, WOOLEN MILLS, KNITTING MILLS, SILK MILLS, DYE WORKS, PRINT WORKS, BLEACHERIES.

also lists of

Dry Goods Commission Merchants,
Dealers in Raw Materials,
Manufacturing Clothiers,
Suit and Cloak Makers,
Jobbers and Large Retailers,
Buyers from First Hands.

Special quarterly issues are published in January, April, July and October; one (January) being a statistical issue, and the others devoted especially to the cotton, knitting and woolen branches, respectively.

OUR FOREIGN COMMERCE.

The statistics of the commerce of the United States for 1897-98 have been published, and it is noted that for this period the value of exports reached $1,210,292,097, over seventy per cent. of which consisted of argricultural products, and twenty-four per cent. of manufactures. The value of imports for this period amounted to $616,005,159, upon which there were collected $149,819,594 in duties. It will thus be seen that the value of our exports were nearly twice as much as the value of our imports. During this period, a large amount of gold was imported, to which is due, very largely, the plethoric state of the money market that we have been experiencing.

We imported about the same quantity of foreign cotton during 1897-98 as we did the preceding year, i. e., about fifty-two million pounds, at an average value of 9.47 cents a pound. Over sixty-five per cent. of the imports came directly from Egypt. More than this proportion of Egyptian cotton, however, was received by our mills, a considerable quantity reaching us from British markets.

We imported a less value of manufactures of cotton in 1898, compared with 1897, though the value of the imports of laces, edgings, embroideries, etc., was about the same. The value of the imports of manufactures of cotton for 1897-98 was a little over thirty-eight million dollars, including duties, which was about 13½ per cent. of the estimated consumption of cotton goods in this country. We arrive at this by reckoning the value of cotton manufactures in the United States at $260,000,000, from which we subtract $17,000,000 as the value of goods exported, leaving the home consumption of the domestic article at $243,000,000. We add $38,000,000 as the value of imports, as above, making the gross value of consumption $281,000,000.

In this connection, it is noted that about sixty per cent. of the quantity

of cotton manufactures that are exported, go to Asiatic countries, chiefly to China, showing the importance to our cotton manufactures of establishing proper commercial relations with the countries in Eastern Asia, and working very much in sympathy with the open trade policy that characterizes English commerce. Though our exports of cotton manufactures were considerably less in 1898 than in 1897, still our trade is looked upon favorably, as one that can be largely increased. This is borne out by the recent statement made in a report to the English government by the assistant secretary to the legation of that country at Tokio. This American trade is expected to be largely increased, and sustained, even in the face of European competition, due to the lessened cost of manufacture, as the result of economical methods stimulated by labor saving machinery that has been adopted by American mills.

The progress that is being made in our silk manufactures is measured largely by the amount of raw silk that is imported, none of any consequence being of domestic production. Over 10,300,000 pounds of silk were imported in 1898, against 6,500,000 pounds in 1897, showing an increase of nearly sixty per cent. Most of these imports, or about seventy-four per cent. of the total, came from Japan and China, chiefly the former country. About the same quantity, in value, of manufactures or silk were imported in 1898 as in 1897, forty-six per cent. of the goods being dress and piece fabrics.

The effect of the tariff on wool was very marked in the quantity of wool that was imported during 1897-98, as compared with the previous year. The decrease in these imports in 1898, as compared with 1897, was over sixty-two per cent. In order to show the relative imports, we give the following statistics:

	1896-97	1897-98
Class I	200,759,079	45,437,067
Class II	37,951,490	4,320,873
Class III	112,141,457	83,031,342
	350,852,026 lbs.	132,795,302 lbs.

Over twenty per cent. of the total imports of class three wool, for 1897-98, was the production of European and Asiatic Russia, and twenty-four per cent. was the production of China. Of class one wool, over seventy-one per cent. was the production of Australasia. It may be noted that about ten million pounds of class three wool was that grown in Great Britain. A very large proportion of class three wool also came from the Argentine Republic.

There was a large falling off in the imports of manufactures of wool in 1898, as compared with 1897, a decrease in value of nearly seventy per cent., chiefly in the value of dress goods for women's and children's wear, and cloths. There was a decidedly smaller quantity of shoddy and like merchandise imported in 1898, as compared with 1897, which enabled our domestic shoddy mills to supply more of the increased wants of our manufacturers.

MANUFACTURES OF MASSACHUSETTS.

The annual statistics of manufactures of Massachusetts, for 1897, have just been issued by the Bureau of Statistics of Labor. These statistics are mainly devoted to comparisons between the returns of 1896 and 1897, obtained from identical establishments ing industries, reporting, as a whole, the value of goods made during 1897 amounted to over $827,000,000. This value as greater than that in 1896, a year of great depression in trade, but less than in 1895. We give in connection with this article, certain statistics, tabulated for convenient reference, showing comparisons, for 1896 and 1897, of identical establishments. In order that the table may be properly appreciated, we will state that the term capital does not mean merely cash capital, or capital stock, but includes the forms of capital devoted to production, such as cash, value of buildings, land, machinery and fixtures, implements and tools, and stock on hand or in process of manufac-

ture. Therefore, the aggregate amounts given as capital invested in the textile industries, include the actual capital of all forms found in the industry at the time of making the returns, and it is obvious that some of the elements included are variable from year to year. Experience in the collection of these statistics has led to the adoption of certain specified items, which are believed to cover the various forms in which industrial capital devoted to production appears, namely: Value of land; value of buildings and fixtures; value of machinery and motive power; value of implements and tools, not included under the foregoing; value of patent rights, etc.; cash on hand; value at cost of raw materials and articles to be used in the industry, on hand at the time of making the returns, including goods in process of manufacture.

In order to show how certain results are obtained, we give the following calculations, taken from the statistics, relating to the manufacture of cotton goods.

Value of goods made	**$85,414,028**
Less value of stock used	**48,987,402**
Industrial product	**$36,426,626**
Paid in wages . . . $26,460,493	
Plus Profit and Expense Fund 9,966,133	
	$36,426,626

By referring to the table, it will be seen that about the same value of cotton goods was made in 1897 as in 1896, but a most decided increase in the value of woolen and worsted goods was made in 1897, as compared with 1896. The earnings of employees were similarly affected, showing a much healthier condition existing in 1897. It will be noted that labor takes a large proportion (from seventy to seventy-two per cent.) of the additional value that enters into the manufacture of cotton.

Throughout the list of textile industries, it will be noted that the average yearly earnings of employees were less than the general average for all industries. The proportion of business done in the textile industries was on the whole greater in 1897 than in 1896, especially in the woolen and worsted branches.

The knit goods mills were run but little more than one-half of their capacity during either of the two years under consideration. If the cotton mills reporting, for instance, had been operated to their full capacity during either 1896 or 1897, they would have turned out a product valued at over one hundred million dollars.

Industries.		Capital Invested.	Value of Goods Made.	Value of Stock Used.	Industry Product.	Total Amount Paid in Wages During the Year.	Profit and Minor Expense Fund.	Percentage of Industry Product.		Average Yearly Earnings.	Average Number of Days in Operation.	Proportion of Business Done. Percentages.
								Devoted to Profit, etc.	Paid in Wages			
Carpets	1896	$ 6,063,962	$ 5,941,456	$ 3,445,442	$ 2,496,014	$ 1,490,036	$ 1,005,978	40.30	59 70	$341.52	244.64	68.83
"	1897	6,784,921	6,361,701	3,894,401	2,466,305	1,603,879	860,926	34 91	65.09	347.33	248.77	67.33
Cotton Goods	1896	112,541,310	85,561,417	49,173,704	36,389,108	25,601,529	10,785,579	29.64	70.36	329.65	279.92	79.52
"	1897	110,615,603	85,414,028	48,987,402	36,426,626	26,460,493	9,966,133	27.36	72.64	343.15	285.15	81.90
Knit Goods	1896	4 033,589	4,799 611	2,304,945	2,494,966	1 655,417	839,549			302.54	286.90	55.79
"	1897	4,136,130	4,500,470	2 190,800	2,309,670	1,588,389	721,281			302.23	294.82	57.11
Woolen Goods	1896	21,635,660	20,985,946	12,183,271	8,702,675	5,494,181	3,208,454	36.87	63 13	374.14	264.69	70 30
"	1897	25,340,617	25,699,328	15,038,303	10,563,025	6,285,365	4,277,660	40.50	59.50	373.46	262 90	78.58
Worsted Goods	1896	14,623,706	17,820,922	10,641,690	7,188,182	4,719,636	2,468,476	46 86	53.14	346.80	285.44	68.40
"	1897	16 3 7,740	24,111,093	14,676,178	9,434,920	5,428,314	4,006,606	52.00	48.00	356 42	294 43	84.94
All Industries	1896	380 799,877	559 880,511	317,341,837	242,730,164	130,539,869	112,299,285			426.66	281.63	59.99
"	1897	394,371,341	576,877,064	330,194,301	246 722,763	13 ,334,975	114 388,688			421 69	283 33	59.72

A SOUND COTTON BALE.

The question has arisen between the American and Liverpool markets, as to what constitutes a sound bale of cotton. Decidedly different opinions are entertained on this point, between cotton men, on this side and the other side of the Atlantic, having arisen from the claims that are being made in the Liverpool market for what is called "country damaged" cotton. It is felt by many in the cotton trade that thes claims are not legitimate and over exacting, though it is admitted that a large portion of the cotton that is received at Liverpool comes in a damaged condition that is a disgrace to some one or more. How or where to fix the blame is a question. There are recent instances of cotton being shipped from an American port that was examined before placing upon the vessel, by expert inspectors, and pronounced every way sound; yet, upon arrival at Liverpool, the cotton was declared to be more or less in a damaged condition, and a large claim was made for "country damage." This term is a most elastic one in its application, and covers any damage from the time the cotton is packed till it reaches its destination, the damage being due to various causes, as exposure and rough handling. All this takes place notwithstanding rigid rules are laid down at some of the shipping ports. These rules, however, have been found indifferently carried out in many instances. What is going to be done in regard to correcting this state of affairs? Some system should be devised by which cotton can pass from plantation to mill in a good condition.

A JAPANESE PUBLICATION.

We are in receipt of the Japan-American Commercial Journal, published at Tokyo, Japan, with a branch office in the Times Building, New York City. This is represented as the first and only official journal of international trade, printed in Japanese and English, and is styled the organ of the Japan-American Commercial and Industrial Association. The publication is endorsed by the Japanese minister to the United States, and also the Japanese consuls in New York and San Francisco.

We allude particularly to this publication, because of the interest we have taken in its advertising matter, which shows a good deal of Yankee ingenuity and enterprise. We refer to a few of the advertisements, somewhat at random. The Yokohama Specie Bank, with head office at Yokohama, advertises a subscribed capital of about twelve million dollars, having branch offices and agencies in all parts of the commercial world, allowing interest on current account of 3 65/190 per cent. per annum on daily balances, and a per annum rate of 4½ per cent. on fixed deposits for three months, and five per cent. on fixed deposits for six months, and 5½ per cent. on fixed deposits for twelve months.

One hotel at Tokyo advertises that it has no inside rooms, which should be a matter of great gratification and an attractive feature to the traveling public, while the cuisine is claimed to be unsurpassed. Among its other attractions are the religious and floral festivals, which daily occur within its vicinity, on a grander scale than in any other part of Japan. At this hotel, many of the noted actors, wrestlers and jugglers make their headquarters.

Miyanoshita has a hotel with first-class accommodations, natural hot springs, with all modern improvements, as electric lights and billiard tables. Like accommodations are furnished by a hotel at Kobe, such as hot and cold water service, electric bells, etc.

At Hirano is to be found a natural and effervescent spring of mineral water, which was represented and awarded a medal and diploma at the World's Columbian Exposition, in 1893. Everybody who tastes it, it is said, likes it. "The whiskey brokers in Perth keep it in their offices almost to a man, as they find it goes far better

with whiskey than the ordinary mineral water."

One of the attractions at a Nikko hotel is a piano, and another is its proximity to the Nikko Shrines. To show the enterprise of the proprietor, the patrons of this hotel are met at the station on the arrival of every train; while another hotel, at Yokohama, has an elegant steam launch for conveying its patrons to and from steamers.

An item of interest in this publication shows that in May, 1897, there were sixty-three cotton mills in Japan, with 767,398 spindles.

TARIFF ON WOOLEN CLIPPINGS.

One of the subjects discussed at the recent conference of the United States local customs appraisers, at the port of New York, was the proper classification of woolen clippings. Our attention was called to this by a paragraph that appeared in the daily press, reading as follows: "The practice regarding this commodity has varied at different ports. In some it was classified as woolen rags, on which the duty is ten cents per pound. In the port of New York, however, it has been classified as woolen waste, on which the duty is 20 cents a pound. The conference decided to adopt the New York classification." Although there was no apparent ambiguity about this item, still we were in doubt as to whether the views of the appraisers were correctly reported. We, therefore, submitted it to one of the appraisers for verification, who informed us that the matter was subjected to considerable discussion, but it seemed that such merchandise was, and had been, classified at the port of New York at the rate of twenty cents a pound, without protest. Furthermore, "communications had been received from the very largest woolen manufacturers, upon the subject, wherein they took the ground that this was not commercially known as rags, and that the classification should be made by the appraiser the same as practiced at the port of New York."

The fact is just this: the local appraisers have come to an understanding that imported new woolen clippings shall be subject to a duty of twenty cents per pound, as waste not specially provided for in the tariff, instead of as woolen rags, subject to ten cents a pound. Although it makes but little practical difference whether the duty is ten cents or twenty cents a pound, as either is prohibitory, the classification is the most perverse one that we have long met with, relating to the wool tariff schedule. How the testimony of any manufacturer familiar with rags and shoddy, could be obtained in support of the New York classification, is beyond our comprehension. New woolen clippings, in the market and with manufacturers, have always been, and are today, regarded in no other light than rags. These clippings are made by tailors in making up garments, and are reckoned among the best stock that can be obtained from which shoddy is manufactured. A similar grade of rags is made at mills from the ends of pieces of cloth, known as "headings," which are cut off so that the piece may be presentable to the trade. These headings are nothing more than rags, and are made as small as it is consistent with the good appearance of the fabric. Of course, if these headings, or any pieces of cloth, are made large enough from which garments or wearing apparel can be made, it is but proper that they should be subject to a different classification; but, even in this latter case, they do not belong in the category of waste.

We doubt very much if this matter will be brought before the Board of General Appraisers, as even ten cents a pound duty is prohibitory on the importation of rags. This can be readily appreciated when it is stated that domestic new clippings sell in this market at from 8½ to 12 cents a pound, and, at the highest price, this merchandise would have to be bought abroad at two cents a pound, in order to compete with the domestic article.

To show still further the prohibitory character of a duty even of ten cents a pound, we will state that no rags, so far as we can learn—certainly no reference is made to them in the statistics of imports—were imported during the fiscal year of 1897-98, that were dutiable. During the fiscal year of 1896-97, there were imported and entered for consumption, rags to the extent of 28,036,235 pounds, at an average value of 6.2 cents.

COUNTRY DAMAGE ON COTTON.

We have no special desire to again allude to the question of country damage on cotton, considering that we have had more or less to say about this matter within the last few months, but it is a momentous one to insurance companies, to which manufacturers and transportation companies have had their attention called very recently, as the result of an investigation that was conducted during the spring and summer months, and reported upon by representatives of a number of marine insurance companies.

It is one of those things that is difficult to remedy, and no means that have so far been tried have proved effectual in lessening the negligence that surrounds the handling of cotton. For their own protection, insurance companies will be obliged during the current season to change their policy of insurance, so that it will not cover country damage, without some limitations. Particularly will this become necessary on all cotton that is shipped from this country to Liverpool, as there is an almost irreconcilable difference of opinion concerning what constitutes country damage between the Cotton Association of Liverpool and the cotton exchanges in this country. We think there is no question that there are many claims for damages, on the part of Liverpool cotton merchants, which are unjust, or which apparently cannot be adjusted or rectified.

These country damages, no doubt, are very largely due to the wretched manner in which cotton is baled, and the exposure to which it is subjected in the course of transportation from the initial shipping point. Cotton, at interior ports, is represented as almost invariably exposed to the weather, in some cases for long periods, on open platforms and at the compress, which results in damage to the cotton, upon which a just claim can be laid. James Maccabe, a representative of insurance companies, states, in one of his reports, that from twelve to fifteen per cent. of cotton in the interior is more or less country damaged when delivered to the central ports.

While this criticism is being made in regard to the handling of cotton in the South, it seems a little strange that some of the large cotton mills in New England, one at Lawrence we have in mind, are willing to expose large quantities of their cotton purchases to the weather in the same manner as is known to exist in the South. We have seen cotton in lots of five hundred bales, stacked up in the yards of cotton mills with nothing to protect them from storm except a board covering at the top. If manufacturers are willing to thus expose their cotton to the weather, they have no real cause of complaint of a similar treatment in the South or elsewhere.

A committee appointed by the insurance companies to investigate this subject of country damage have reported that the defects in the present methods of handling cotton are so great, the requirements of handling so large and bulky a crop as cotton in a comparatively few months are so severe, that little or nothing can be accomplished by the underwriters in the way of a reform. That a continuous period of rain at any time during the shipping season means very heavy country damage claims; that unless the shippers and carriers find it to their mutual interest to alter present methods, nothing will be accomplished. If insurance companies are governed

by this report, we do not see how any reformation can be brought about through their agency, unless they resort to what many may attempt to do this season, of eliminating from their policy the clause relating to what is understood as country damage.

L. G. Farmer, of Boston, well known as an attorney in cotton insurance cases, in a recent report of his upon this subject, makes the following interesting observation.

"Upon the general question of what is to be done to make the Southern people appreciate the importance of taking better care of their principal staple, I hardly know what to say. I talked with steamer captains, stevedores, Southern cotton mill men, cotton growers, brokers, merchants, all sorts of people whom I meet in traveling about, and they all tell substantially the same story. The small farmer who raises half a dozen bales and discounts them for groceries at the village store, or sells them to a local factor, cannot be expected to do very much in the way of providing a shed for it, so he leaves it out in his front yard, or his back yard as the case may be, exposed to every rain that falls. I saw it from the car windows myself. Of course this results in some damage. There would be less if they would change the ends of the bale once in a while, and give the end which has been standing on the ground and absorbing wet a chance to dry, but this would involve too much effort. The same ought to be done on the railroad platforms, but that would mean a couple of cents a bale more expense, and prices are so low now that every additional charge is a heavy burden. We have no country damage claims of any consequence in New England. 'Wet packing' and other fraudulent practices are made criminal offences by the Georgia Code, and I suppose there are similar enactments in other states. Investigation at some of the interior towns where the cotton is compressed might develop a condition of things which needs improvement in this regard, but I feel sure that if all-rail or rail and coastwise steamer cotton comes to our New England mills undamaged, it also reaches Galveston, New Orleans, Mobile and Savannah in good order, and ought to reach Liverpool or Bremen in 'like good order and condition,' so far as any damage done to it before it is loaded into the ship is concerned."

It may be well to state that marine insurance companies have been in the habit of insuring cotton through from the interior until delivered at destination, in Europe, and have agreed to pay claims for damage while in transit, the insured subrogating to them their claim for damage, whether caused by neglect or fault of the carrier. The claims for this damage are now classed as country damage, and the amounts paid by underwriters on this account have been steadily increasing, and have now reached such proportions as to require radical action by underwriters. As a matter of information, we may further say that when cotton arrives in a damaged condition in Europe it is customary to pick off the damaged portion, no matter how small it may be, and the bale put in a merchantable condition. The average cost of this is estimated to be between 75 cents and one dollar per bale. It is estimated that country damage claims and re-conditioning charges on cotton arriving last season in Liverpool exceeded half a million dollars.

It is hoped that some improvement in this respect may be consummated by the new methods of baling cotton in a cylindrical form, with better covering and protection against the usual causes of damage.

TAXING MILL PROPERTY.

The taxation of mill property has now become largely a matter of science, and familiarity on the part of assessors with the facts that enter into the valuation, for manufacturing purposes, of machinery. One of the most interesting cases that have come before the courts of late is the one of the Amoskeag Mills against the city of Manchester. Although this case involves a large sum of money and affects very materially the tax rate of the city of Manchester, it is, after all, a very simple one, and attracts attention more largely on account of the parties concerned.

The claim of the mills is, that the

city has taxed its property at a higher ratio of its true value than other city property, that is to say, the Amoskeag property has been assessed upon the basis of seventy per cent. of its true value, instead of fifty-five to sixty per cent., as other properties in the city are alleged to have been taxed. The question is simply one of facts underlying the principles applicable to the property of all tax payers, that the taxation must be equally based at the same rate, and so arranged that no one shall bear either more or less than his proportionate share. As we understand it, there is no great difference as to the true value of the mills' property, the determination of the case depending upon its taxable valuation.

We allude to this case because of certain interesting things that have come to the surface, one of which is the method of fixing the assessment of valuation from stock sales, in case of corporations, when speculation is not indulged in. This method is sanctioned by the courts, and is regarded as equitable. Another interesting point brought out in the discussion of this case, is the important position that the Amoskeag Manufacturing Company occupies in its relation to the general welfare of the city of Manchester, in that its property represents one-fifth of the total valuation of all the property of the city, so that, even should the taxable valuation of the mills' real estate, etc., be reduced, the tax rate would necessarily be increased affecting the company's property, in the ratio of one to five.

The following facts were also brought out, that the mills' original capital of $600,000, was increased at different periods up to $3,000,000. Extra dividends were paid in 1846-47-49 of 25, 25 and 20 per cent in stock; March, 1863, 10 per cent. cash; December 1, 1879, a dividend paid in Amory stock (par $100) share for share and then each share of Amoskeag was entitled to two shares more Amory at par. Paid 33 1-3 per cent. December 15, 1887 in stock, increasing capital to $4,000,000. This company made the poorest record of its existence for the fiscal year ending June 30, 1897. The first six months the net profit was $80,432 and a loss of $3814 the last six. Dividends, however, of 5 per cent for the year were paid mainly from the surplus. Since 1835 there has been only one year that this company has passed its dividends, and that was in 1840. Never has it paid less than 8 per cent. per annum in cash to its stockholders in the long series of years from 1860 to 1894, and that but once. For five years it paid 9 per cent., and over and over during those thirty-five years it paid 10 per cent. on a three million dollar capital down to 1887, and after that on four millions.

—We have had more or less to say in our mill news items regarding the establishment of a carpet mill at Gaffney, S. C., with sufficient capital to make it a prominent feature in the textile industry of the South. The equipment includes 59, thirty-six-inch looms, and art square looms. We have just received information from our Southern correspondent that the mill has just started up with most promising prospects. Some of the most enterprising men in the South, familiar with textile manufacturing, are interested in the scheme. The next thing for Southerners to do is to raise sheep so as to furnish wool for manufacturing enterprises of this kind. It would be a good idea, anyway, if the farmers of the South turned their attention more to sheep husbandry than they do. From an agricultural point of view, to say nothing about the manufacturing demand for the product, the raising of sheep would add materially to the value of the farming lands of the South.

—Taking the United States as a whole, it appears that 48,861 passengers were carried and 1,223,614 passenger-miles accomplished per passenger locomotive for year ending June 30, 1897, and correspondingly there were 36,362 tons carried and 4,664,135 ton-miles accomplished per freight locomotive.

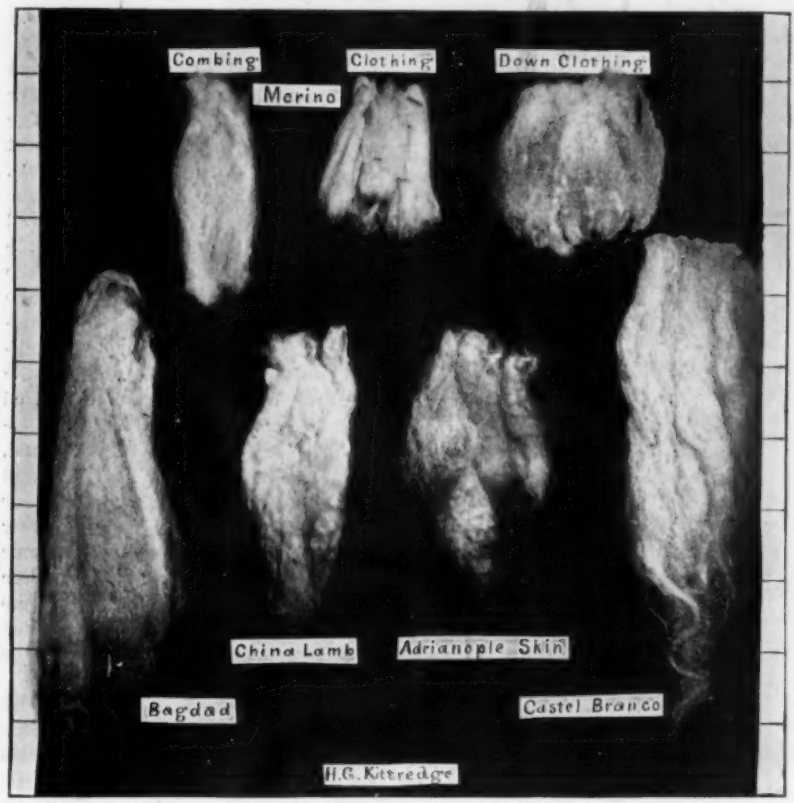
The Wool Tariff.

FIRST, SECOND AND THIRD CLASS WOOLS.

In order to give our readers some conception of the different wools that are classified into three classes, for dutiable purposes, under the tariff of 1897, we give, herewith, three sets of illustrations showing the representative wools that are referred to. The classification of wool. The additions to the 1890 tariff are expressed in italics, and the eliminations are put within brackets.

All wools, hair of the camel, goat, alpaca, and other like animals shall be divided, for the purpose of fixing the duties to be charged thereon, into the three following classes:

Class one.—That is to say, merino, mestiza, metz, or metis wools, or other



Inches. CLASS I WOOL. *Inches*

principle governing the classification of wool under the present tariff is similar to that which has been in vogue for the last thirty years, with this important innovation, the uses to which some of the wools are put are prominently considered, instead of a strict conformity to classification by blood.

We give below that portion of the tariff having a direct relation to the wools of Merino blood, immediate or remote, Down clothing wools, and wools of like character with any of the preceding, including *Bagdad wool, China Lamb's Wool, Castel Branco, Adrianople skin wool or butcher's wool, and* such as have been heretofore usually imported into the United States from Buenos Ayres, New Zealand, Australia, Cape of Good Hope, Russia, Great Britain, Canada, *Evgpt, Morocco,* and elsewhere, and [also including] all wools not hereinafter [described or

designated] *included* in classes two and three:

Class two.—That is to say, Leicester, Cotswald, Lincolnshire, Down Combing wools, Canada long wools, or other like combing wools of English blood, and usually known by the terms herein used, and also hair of the Camel, *Angora* goat, alpaca, and other like animals.

Class three.—That is to say, Donskoi, native South American, Cordova, Valpariso, native Smyrna, Russian camel's hair, and [including] all such wools of like character as have been heretofore usually imported into the United States from Turkey, Greece, [Egypt], Syria, and elsewhere, excepting improved wools hereinafter provided for.

The standard samples of all wools which are now or may be hereafter deposited in the principal custom-houses of the United States, under the authority of the Secretary of the Treasury, shall be the standard, for the classification of wools under this act, and the Secretary of the Treasury, [shall have the authority] *is authorized* to renew these standards and to make such additions to them from time to time as may be required, and he shall cause to be deposited like standands in other custom-houses of the United States when they may be needed.

Though the hair of the camel and alpaca is included with sheep's wool, it was not the intention of the framers of the tariff to promote the raising of either the camel or the alpaca, but simply to promote the raising of sheep. The camel or alpaca industry is not one that is expected will receive any encouragement in this country, but the hair or wool on these animals is assumed to come in competition with the wool of the sheep, hence they are included in the tariff.

If it were not for a carefully selected list of standard samples of wool for custom-house use, more or less confusion would arise under the language of the paragraphs relating to the classification of wool; hence, it is of the utmost importance that a proper selection of standard samples shall be made by experts familiar with the character of different wools, and by those conversant with the object or purpose of the tariff.

There is in the possession of the government, a number of whole fleeces and large standard samples that are used only in cases of litigation. In addition to these, and supplementary, there are duplicate standard samples for use in the appraisement and classification of wools, which can be found at the principal custom houses (Boston, New York and Philadelphia), in this country.

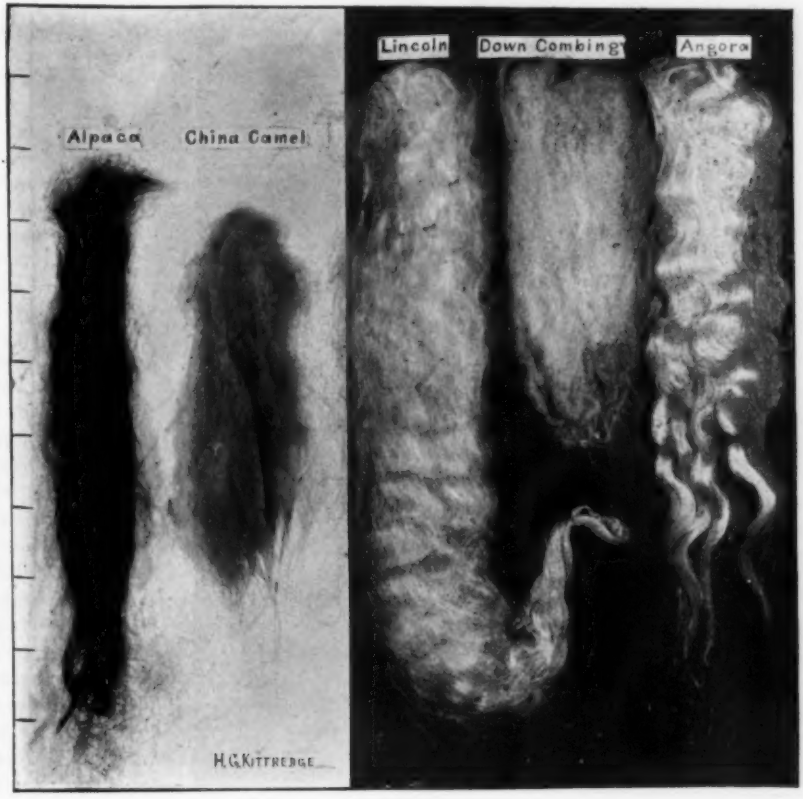
The standard samples for custom house use under the 1897 tariff, have not yet been officially revised. The samples now in use, arranged to meet the new conditions so far as possible, are those that were made in pursuance of the provisions of the 1890 act, and according to the instructions of the Treasury Department in 1891, in the appointment of a committee to make proper revisions of the standard samples. The final report of this committee was not made until 1893, and the principle of classification recognized by this committee was that first established by the late G. W. Bond, under the tariff of 1867, of race and blood only, and not that of use or adaptability; and they stated in their report that in their classification some of the wools in the first class were suitable only for carpets, and some appeared in the third class from which a fair article of clothing could be made.

In class one wool, of course, are all wools with the least strain of merino blood. With these are included wools from Buenos Ayres, as River Platte; Chile; Peru; Montevideo; Australasia, as merinoes and crossbreds; Algeria, as Benghazi, Constantine, and Oran; Morocco, as Larash abudia and beldia, Mazagan, Rabat, Saffi, and Urdigria; Cape of Good Hope, as Karoo, Natal, etc.; Turkey, as the improved, Panorme, and Flamantine skin wool; Austria, as Buda-Pesth Zigaya skin wool; France, as Burgundy, Champagne, Marseilles chalk skin wool, and St. Denis skin wool; Italy, lamb skin wool, and Naples skin wool; Portugal,

as Alentijo fleece; Russia, as Odessa fleece; Spain, as Churro fleece an Talavera; Turkey, as Adrianople fleece, Kassapbatchia skin wool, Rodosto fleece and Varna Zigay fleece. Burgos Churro wool, from Spain, is included in class three wool.

In class two wools may be mentioned the fleece from the llama, vicuna and huarizo cross of the llama and alpaca. With these are included wools from the Argentine Republic, of pure Lincoln blood; Cape of Good Hope, as mohair fleeces; China, as camel's hair and cashmere goat's hair; Turkey, as mohair; England, all the pure English blooded wools, except Down clothing wool, as the Lincoln, Leicester, etc.; Scotland, as the black face and cheviot, and similar crosses.

In class three wool, all native, or aboriginal, wools are placed, with the exceptions as enumerated in the paragraph referring to class one wool. This class includes wools from the Argentine Republic, as Cordoba; Chile, as Valparaiso Criolla; Afghanistan, as Kandahar, which is commercially known as East Indian wool, being of the same character; Thibet; East India, as Bombay black and gray skin wool, Joria, Marwar, and Vicaneer; Georgia; Persia, as Bokhara, Khorassan, and Mosul; Syria, as Aleppo and Orfa; Turkey, as Armenia Erzroom, Bouldor, Smyrna, Salonica, Albania, certain qualities of Kassapbatchia, etc.; Austria, as Buda-Pesth Zackel skin wool; England and Scotland, as Herdwick, black face Highland; Holland, native washed fleece; Italy, coarse skin wool; Iceland; Portugal,



Inches.

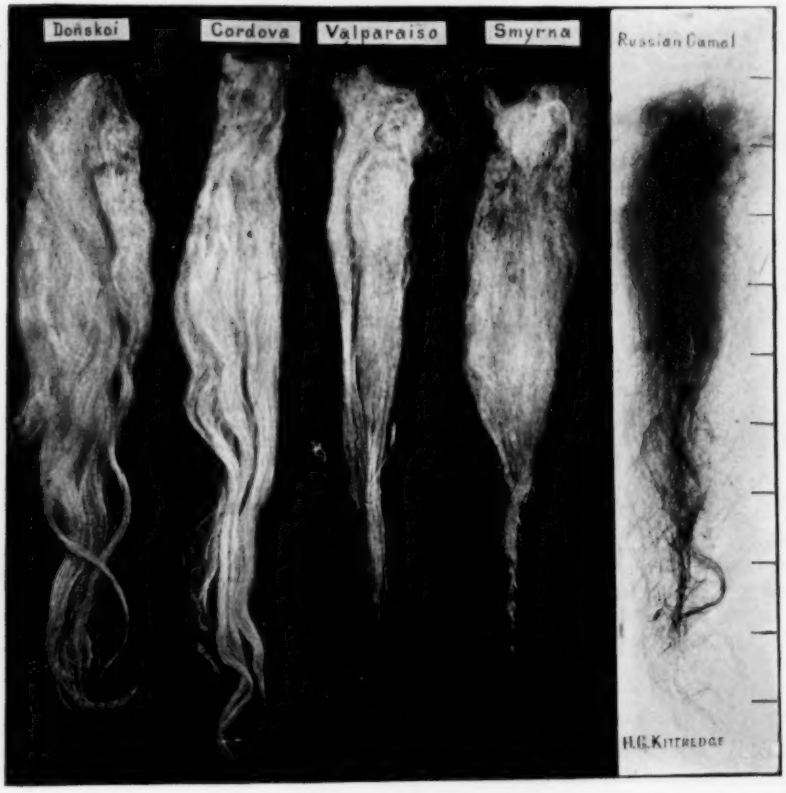
CLASS II WOOL.

as Oporto; Russia, as Calmuc fleece, Donskoi, etc.

China lambs' wool, Bagdad from Persia, Egyptian, and Castel Branco from Portugal, which are now classified with wools of the first class, were, under the 1890 tariff and prior, with wools of the third class.

Common goat hair is on the free list, under the 1897 law, but was dutiable under the 1890 law. A recent decision of the general appraisers has been made on an importation of common goat hair, fixing its classification as a non-dutiable article.

It will be noted that all camel hair, other than Russian camel hair, is in class two. The so-called Russian product is in class three. As a matter of fact, all such hair in commerce comes from the same animal—the Bactrian camel that inhabits all of Central Asia. The difference exists simply in that the Russian hair is shipped from Russian ports, is less carefully selected, and contains a greater or less quantity of the long hair of the animal. Other camel hair comes wholly, or chiefly, from Chinese ports, is more carefully selected, the hair plucked out, and the general condition superior. The Chinese hair contains more of the undergrowth, or pushm, as seen in the illustration. The imports of hair in 1896-97, were 730,635 pounds, at 13 cents, second class; and 2,313,536 pounds at 9½ cents, third class.



CLASS III WOOL. *Inches.*

—A knitting mill at Laconia, N. H., is about to install some full fashioned knitting machinery, which it will import from Germany. Why is this necessary? Cannot this machinery be made in the United States?

Corrections and Further Suggestions Invited.

SUGGESTIONS FOR THE SCIENTIFIC INVESTIGATION OF THE INJURY DONE AND THE IMPAIRMENT OF THE STRENGTH OF THE COTTON FIBRE IN EACH OF THE PROCESSES WHICH ARE NOW ASSUMED TO BE NECESSARY IN THE CONVERSION OF COTTON INTO CLOTH.

Editor Textile World:

The cotton fibre is twisted upon its own axis. Its form is that of a ribbon pointed at one end, slightly blunt at the point of attachment to the seed, a little thicker at the edges than through the middle. It is capable of being spun through the interlocking of these convolutions of the twist. Immature cotton, which does not take on the full measure of the twist, is slippery and can no more be spun than the fibre of the milkweed (or Asclepias cornuta) or the fibre of the cotton tree of the West Indies.

These fibres attain a certain average diameter, length and strength, according to the type of the cotton, the fertility of the soil and the quality and the character of the season. If their initial strength be established on the index number one hundred, it would prove in practice that if a fixed or given number of fibres could be carried separately from the field through the gin, the press, the picker, the card, the drawing, the spinning and the weaving, the index number representing their original textile strength at one hundred will have been reduced in excessive measure. It has been alleged to twenty-five.

This progressive impairment is caused by the imperfection of existing mechanism. As yet no one has, within my knowledge, attempted to measure the progress or successive stages of this impairment. When I first presented this subject about twenty years or more ago, and exhibited the first micro-photographs of the cotton fibre that had ever been made and presented in this country, I laid down the principle that in all future progress in the conversion of cotton into cloth regard must be given to the form and structure of the fibre itself, and that all true improvements must be governed by the logic of the case. That is to say, every process must be conducted and improved in order to retain as far as possible the original form, structure, elasticity and strength of the fibre as these factors are to be found in the seed cotton.

Many processes, which are to some extent empirical, are now in progress, which are based on the logic of the case; namely, in the development of the cotton gin, whether or not the roller gin ought to be and can be substituted for the saw gin; the cylinder bale, whether or not the bale in which the cotton is wound in a lap or the bale in which the cotton is pressed in a spiral will prove to be the best. In the factory, improvements in process are accompanied by very high speeds, which may be more or less injurious.

The question now arises, can any method be devised short of working a large and separate quantity of cotton into cloth, by which the relative injury of each process may be approximately determined. On this line I beg to present the following theory. A large or sufficient parcel of cotton grown on one field might be traced or given a direction from that field through the gin, the compress and the factory into cloth. Samples of that cotton in sufficient number may be taken from that parcel at each of the various stages. Then comes the problem. Can a given weight of this particular parcel, which would correspond with sufficient accuracy to a given number of fibres, be subjected to tests of tensile strength in any apparatus now existing or that may be devised for that purpose? It is conceivable that the number of fibres which will exist in one inch, say of No. 14 yarn, may be computed from the weight of that inch of yarn. It is then conceivable that a corresponding weight of fibre may be separated from the seed by hand. The same weight may then be separated from the cotton after it has passed the gin, after

it has been baled, after it has been compressed, after it has been opened in an opener, after each process of picking, carding, drawing, roving, spinning and weaving. Apparatus invented by Prof. John M. Ordway now exists or can be made for measuring the strength of each of these parcels, and from that comparison the relative injury at each process may be deduced, providing the experiment is undertaken on a sufficient scale, covering a sufficient number of separate tests.

Such may be a theory on which practical tests can be made. In what direction would improvement possibly be indicated? First: In the relative merits of the saw gin and the roller gin. Second, and of great importance: The fibres of cotton are more distinctly separated from each other and are in a looser condition when they leave the saw gin than they are at any other point in the process of treatment, therefore at that stage the leaf and other injurious substances ought to be removed. If it long remains necessary to subject crude cotton to rapidly revolving beaters, corresponding to the beaters in the opening and picking machines, such beaters, one or more, ought to be applied to the cleaning of the fibre from foreign substance on the way from the cotton gin to the first baling. After the cotton reaches the mill the crude cotton is subjected to several beaters, under different systems from two to six, the selection of the process being now purely empirical.

The question arises at once, may not the cotton be wound on a cylinder bale in laps after being treated with one beater or other process for removing leaf and other injurious substance at the gin? May not the laps from each of these cylinder bales then be delivered in multiples from a given number of bales into one lap directly to a finisher picker of one beater, in order to be prepared for carding? How much of the injury to the fibre would be saved in that way? Can anyone yet answer that question? Such a process would tend to the division of the manufacture of cotton into separate departments, beginning at the field, ending at the bleachery and the print works. Is not this work of a kind that ought to be taken up in the textile schools with the co-operation of the managers of one or more factories? Is not this suggestion on the line of the improvement of cotton by methods which are governed by the logic of its own form and structure?

It is probable that the particular investigation of this subject, if it is worth taking up in order to determine whether or not my hypothesis is well grounded, might be accomplished in the best manner in a textile school supplied with a full complement of cotton machinery, on which one to three or four bales of the cotton could be put through into cloth, the machinery having been previously cleared of all other cotton. The organization which is now being established in the Advance Gin & Mill Company, at Vicksburg, would enable the manager to buy seed cotton of the best kind of an average staple from a given field, to gin this in the best manner, partly upon a well adjusted saw gin, partly upon the roller gins which are about to be established in sufficient measure. It might even be possible for the manager to interpose a light whipper or beater between the saw gin and the press, thus sending cotton of identical quality from the same field in three different forms; number one, baled directly from the saw gin; number two, whipped or beaten between the saw gin and the baling; number three, ginned on roller gins. Another bale might be prepared of the same cotton, ginned at very high speed in the customary way without any special attention to maintaining its quality above that of the average cotton from the ordinary gin, making four examples each of which could be tested on its merits. The finer the yarn into which it should be spun the less would be the relative number of fibres and therefore the less margin of error in the results.

Of course such an undertaking implies a long period of application un-

der most careful and skilful direction. Is it worth the effort? If it is true that a great deal more than half and probably three-fourths the initial strength of the cotton fibre is sacrificed in the effort to promote speed in the work and quantity in the product, by a series of compromises from beginning to end, there is surely a large margin to be saved if the bad work can be placed at any particular part of the progress of the fibre which has not yet received the attention which has been given, for instance, to spinning and carding.

My own convictions have been formed with every successive visit that I have made to English mills since my first visit in 1877; namely, that while the attention of our own inventors and machinists had been given in the first instance to looms and ring spinning frames, we had for a very long period lagged far behind in carding and preparation. In the last few years we have gained on our English competitors and perhaps have got even with them on carding; but from all that I can learn and observe we are still far behind in the classification even of the same lots of cotton into separate parcels, in the mixing of cotton, and in preparing the crude cotton for the carding engine.

It is a trite saying that "cotton well carded is half spun." Is it not equally true that cotton well selected, well mixed and well prepared in the opening and picking room is half carded? Is it not also true that the well ginned cotton of Egypt is vastly to be preferred to long cottons of even strength and fineness which have been murdered on the raw gin? What would happen if it should prove, as I suspect it may prove, that next to the saw gin the greatest injury to the fibres of all cotton is done between the bale and the finisher lap of the last picker? Suppose ten per cent., or what I believe to be more probable, twenty per cent. of the loss of the index number one hundred on its way down to twenty-five is detected and remedied by diminishing the number of beaters and treating the cotton as gently as the delicacy of its form and construction demand?

Again, it may happen that in the compromise of the drawing frames, in which we multiply the number of draughts and doublings in order to get an even roving, we may very greatly impair the strength of the several fibres, even though we may appear to gain in the strength of the yarn after they are twisted through the evening of many doublings; hence comes the necessity for testing a number of fibres corresponding to the number that may be found in an inch of yarn after untwisting them, laying them parallel and finding out how much of the initial strength may be left. It will be remembered that the average product per year in yards of standard sheeting of each operative in 1830 was 4321 yards, accomplished in long hours of work. The average product per operative on the same fabric in short hours of work in 1884 was 28,000 yards. I believe it is now 32,000. Suppose ten or fifteen or twenty per cent. of the initial strength of the fibre now destroyed by bad ginning, bad baling, bad opening and bad picking should be saved, what would be the product per operative in each year in yards of standard sheeting spun on existing spindles and woven on existing looms?

Such are the terms of the problem on which I present the theory in the hope that it will be proved whether it is a delusive hypothesis or mere fancy without adaquate basis, or a true theory capable of being put in practice based on the logic of the form and structure of the ultimate fibre of cotton as it comes from the seed.

The only facts which I can now submit in support of this theory are:

First, prices at which British fine yarns and fine goods are sold cannot be accounted for by any difference which exists in the rate of wages, even if the rate of wages were a true criterion of the cost of labor. May it not happen that the product of English fine yarns is greater than our own on account of closer attention to the sorting of cotton and to the much less

number of beaters to which that cotton is subjected before it reaches the card? Again, we are exporting cotton waste to Europe. Is not that a sign of want of economy in our own processes?

Second, in support of this explanation, I have reason to believe that cotton has been carefully ginned on saw gins in the South, carefully baled in laps of the American Cotton Company's system, that it has then been treated in a factory on an opener lapper with one beater, and then converted into a finished lap on a one-beater finisher lapper. I have reason to believe that the cardings and rovings from this cotton were more even in weight, and that the yarn of about No. 24 showed a breaking strength more than fifteen points above the standard of good work.

Third, during the dry months of winter, the chrome gelatine roll, made elastic by the use of glycerine, which I invented a great many years ago, worked successfully in the Indian Orchard Mill; this roll was applied on one side of a ring spinning frame of which the other side was fitted with a leather covered top roll. On an experiment of sufficient duration to prove the facts, the weights on the gelatine roll were reduced more than one-half as compared to the leather roll. This made a difference in the draft, which was adjusted. The yarn was then tested from time to time. The difference in strength was continuously eight per cent. in favor of the gelatine roll. Presently came the humid atmosphere of an April dog day, when the glycerine attracted the moisture from the atmosphere and the gelatine roll was of necessity condemned.

There is reason to believe that the normal cotton fibre possesses the strength of a fibre of wrought iron of the same diameter and form. Reference may be made to a copy of a report made by Professor John M. Ordway, many years since, of which I had occasion to ask a renewal in May, 1897, which is appended hereto. I think that if the readers will interlock their forefingers in the way in which the fibres of cotton interlock and then imagine what would happen if they drew their fingers apart many times under the pressure of heavy weights corresponding to those on drawing, roving and spinning frames, they would come to the conclusion that the oftener they drew their fingers apart the more the conditions of the skin and the strength of the finger would be impaired. May not this indicate in some measure what happens to the fibre of cotton under corresponding conditions?

Having submitted the preceding text to Mr. R. Dordeyn, of the Advance Gin & Mill Company, of Vicksburg, my attention has been called by him to certain facts which are of importance. He does not agree that the place to remove dirt and trash from cotton is between the gin and the bale box, but holds that it is between the boll and the gin. Much of the injurious matter may be avoided by improvement in picking. We are, however, dealing only with the improvement in mechanism. "It will be borne in mind that the roll box of a saw gin is very much like a grinder and mixer. The seed itself and the leaves all roll and rub each other and mix themselves: the hardest one, the seed survives; all of them are picked and grabbed by the saw teeth. These teeth still further break up the leaves and trash in small bits and the brush diffuses them all through the cotton. Not so with a roller gin. A roller gin gets rid of the gross impurities. What thumb leaf adheres to the fibre does so in such large particles that they are readily gotten rid of in the mill beaters or carding engines." These are Mr. Dordeyn's views. When the farmers can be persuaded to sell seed-cotton it can be treated in a whipper or trash cleaner where the greater part of the leaf can be removed and also all other impurities. The grade of the cotton would then be raised more than it can be between the gin and the baling.

Another advantage of the roller gin soon to be tested on an extensive

scale by the Advance Gin & Mill Company, is the absence of what are technically called the "neps" in roller gin cotton. These neps, as distinguished from motes and other trash, consist of the very short hairs which are detached from the green seed cotton when struck hard by a saw tooth. Nothing of the kind occurs on the roller gin.

Another important point is brought out by Mr. Derdeyn. Having been requested by the late Sir Benjamin Dobson to prepare some long cottons, one sample, No. 1, was ginned in the usual way, producing three hundred and forty (340) pounds of lint cotton from one saw gin of eighty (80) saws, twelve (12) inches in diameter per day.

Sample No. 2 was ginned in the same manner but with breast raised. This placed the saws in the roll only half as deep as before, permitting them to take only the largest fibres and detaching from the seed only about sixty (60) per cent. of the fibre.

It would not be profitable to the grower to gin cotton in this way, although, of course, the uniformity of the staple gave this sample a strong preference. It will be observed that this process of ginning would correspond in some measure to the work of a comber. I have therefore suggested to Mr. Derdeyn the possibility of setting two gins together tandem, separating fifty (50) to sixty (60) per cent. of the cotton of long and uniform fibre at No. 1, the rest of the cotton at No. 2, baling separately so as to get a uniform bale of long staple and a uniform bale of short staple from the same seed. Whether or not this would be profitable time will show. It is only one of the many suggestions which come into view on a theoretic research of this subject.

EDWARD ATKINSON.

Boston, July 28, 1898.

We tried specimens of cotton from Alabama, 60; Arizona, 4; Arkansas, 13; California, 19; Florida, 45; Georgia, 52; Indian Territory, 2; Louisiana, 24; Mississippi, 18; Missouri, 6; North Carolina, 94; South Carolina, 26; Tennessee, 7; Texas, 72; Virginia, 8;—450.

In each case five sound fibres were separately tried for strength, five for length, and twenty (20) for width.

The average breaking weight was 133.1 grains.

Length, 1,085 inch.

Width, 1/1108 of an inch.

I had no apparatus for untwisting the fibres and holding them edgewise under the microscope so as to determine the thickness. I contrived one but had not the means to get it made.

In Hugh Monie's book on "The Cotton Fibre," (1890), he gives the mean diameter of Texas cotton as 1/1310 inch, but he must have measured the mean width instead of the mean diameter.

You can see that a cross section, very similar to a figure 8 turned sideways (∞) would not have an area as great as that of a rectangle having the same width and half the height, and I feel quite sure the thickness of the cotton fibres does not average half the width. It would not be more than one-third.

If we allow the area to be equal to that of a rectangle 1/1108 by 1/2216 of an inch, it would take 2,455,328 fibres to make one square inch, and these would hold 326,804,157 grains, or 46,686 pounds. So it would be quite safe, I think, to say that a solid rod of cotton one inch square would hold up 46,686 pounds, which is nearly as much as a bar of common wrought iron will sustain.

If we set the thickness of the fibre as one-third of the width, it would take 3,682,992 fibres to make a rod one inch square, and the breaking weight would be 70,029 pounds.

Good wrought iron will bear a tensile stress of somewhat more than 50,000 pounds, Bessemer metal of over 120,000 pounds, and the best cast steel of over 150,000 pounds.

The hollow in dry cotton cells is very small, and so strong compression would not reduce the size very much. Of course the cell walls are porous, for they allow water to pass through readily; but the pores are too small to be seen with the microscope. There

are no data to be had to determine the compressibility of the fibre. When we iron or calender cotton goods hot, we bring the fibres closer together but probably the fibres themselves are not condensed.

I regret that I have hitherto been unable to determine the thickness of cotton fibres and the amount of twist, and therefore cannot give exact figures.

I believe the estimate of the tensile strength of cotton fibre as lying between 60,000 and 70,000 pounds per square inch is reasonable.

JOHN M. ORDWAY.
Tulane University of Louisiana,
New Orleans, May 10, 1897.

Diffusion of Light.

The subject of lighting factories is one of great importance in mill architecture of today, especially so since the universal introduction of large windows which let in a flood of light, having a more or less injurious effect upon the eyes. In order to overcome many of the objections to these conditions, and especially to the use of plain glass, attention is now being called to the use of corrugated or ribbed glass, for the diffusion of light. Edward Atkinson, of Boston, has given more study to this subject than anyone else that we know of, and his views and investigations concerning the use of ribbed glass have been given in two circulars issued by the Boston Manufacturers Mutual Fire Insurance Co., of which he is president. This subject has engaged Mr. Atkinson's attention for the last twenty years, but more particularly of late.

In the study of lanterns for factory use, Mr. Atkinson's observations were turned to the various forms of prismatic glass which is applied to the concentration of the rays of light, notably in the Fresnel lens, which is in common use in the light houses. He reasoned that if the rays of light could be concentrated by one set of prismatic forms, they could be diffused by another arrangement of similar forms. Upon consultation with glass manufacturers and scientists, as to the true forms of the prisms for the deflection of the rays of light, he found that the cost of setting up the plant for making the glass would be quite heavy, also the cost of the product would be very high, and that the probable result would be very uncertain, besides the great difficulty of keeping deep cut prisms free from dust, soot and other kinds of dirt. His inquiries and investigations led him to secure samples of a large number of plates of glass, such as could be found in the market, and the result of his experiments disclosed the fact that the greatest and most uniform diffusion of light was not derived from prismatic or angular forms, but from simple ribbed glass in true curves, inverse and obverse, twenty-one ribs to the inch. This type fortunately happened to be in common use for glazing windows of lavatories and similar places, and it was also found to be the cheapest type of glass suitable for glazing windows, except the common colored glass.

It became evident, however, that a more complete research was needed, and the matter was placed in charge of Prof. C. L. Norton, of the Institute of Technology, Boston, and his conclusions were published in a circular issued in 1895. A second and more complete investigation has recently been made, and the present state of the art is submitted in the following report, which we give in abstract, by Prof. Norton, together with illustrations showing the comparative distribution of light by the use of plain and ribbed glass.

In all mills, print works, and other places devoted to color work, the greatest care should be taken to select pure white glass. Many kinds of glass which appear to be pure white, show a distinct greenish tinge if examined on the edges. A very slight tint of green destroys the possibility of discrimination in many colors.

In reference to the opposition on the part of factory operatives who have

petitioned the Massachusetts legislature for an act forbidding the use of ribbed glass in the windows of factories, on the ground that it prevents working men and women from looking out of the windows, Mr. Atkinson says, that it has not been difficult in proving to the Labor Committee the true purport of this improvement, and the bills that have been introduced have never been reported favorably. A bill of this kind was introduced at the last session of the State legislature as House Bill 301. The committee on labor reported adversely, and its report was accepted. In order to satisfy this objection on the part of the operatives, it is advised that an occasional window of clear glass be used, or the glazing of the lower lights say one-quarter part of each window, with clear glass. By this method, the loss is small, and the diffusion on the upper lights is much greater and more desirable.

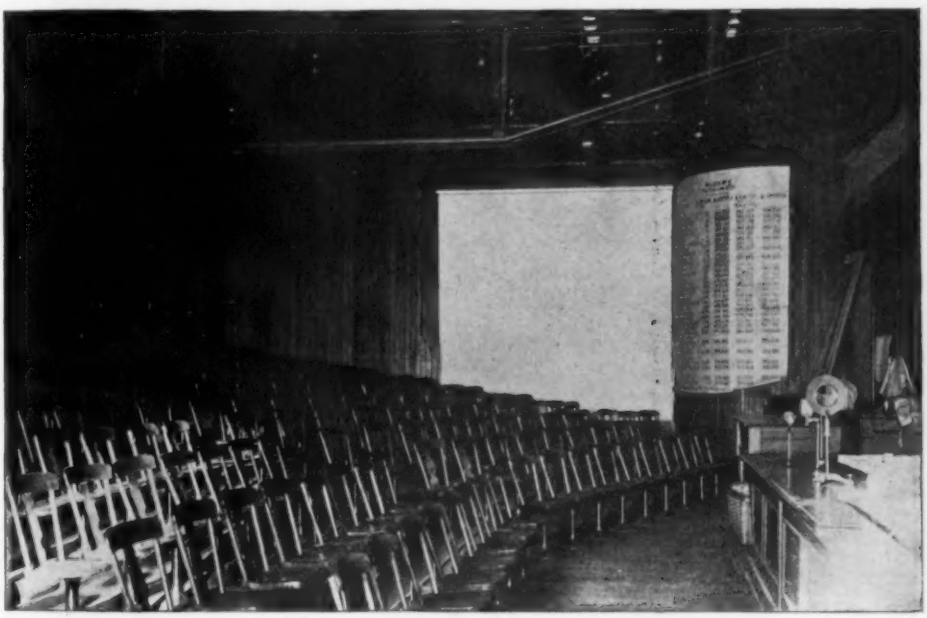


PLATE I—PLAIN GLASS.

Prof Norton's report is as follows:

"The light entering a room through a window comes, for the most part, from the sky and has, therefore, a general downward direction, varying with the time and position. Hence the position of the room which receives the most light, ordinarily, is the floor near the windows. But, if we interpose in this downward beam of light a dispersive glass, the light no longer falls to the floor, but is spread out in a broad, divergent beam, falling with nearly equal intensity on walls, ceiling, and floor. We must bear in mind that we gain nothing in the total amount of light entering the room, but we have simply redistributed the light, taking up from the floor that which fell there and was comparatively useless, and sending it in directions where it is of more service. The result of the examination of the various glasses was to show that a finely ribbed or corrugated glass was better than the others, as it gives the widest and most uniform distribution. There is no apparent gain in corrugating both sides. Ground glass is barred out, because of its actual loss of transparency, caused by slight amounts of moisture or dust. The ribbed glass about 3/16 of an inch thick, with

twenty-one ribs to the inch, known now as factory ribbed glass, is the best dispersive glass upon the market. When a glass of slightly better appearance is desired, that which is known to the trade as "maze" glass is the best. It is similar to the fine ribbed glass, except that the ribs are not straight, but are bent into irregular figures.

"The earlier tests were made to determine the relative intensity of illumination in a room where its windows were glazed with one or another kind of glass. Many kinds of glass were tested, in fact, all that could be found including the more expensive "cathedral" glass and the Luxfer prismatic glass, but the fine factory ribbed glass proved, in all cases, the best. Speaking broadly, the tests showed that the centre of the room was as bright when it contained a window of one square foot of ribbed glass as with a window of three square feet of plain glass. This is true in all lights, —from bright sunshine to a heavy thunder storm, and with the window facing in any direction. Attention is called to Plates I and II, being photographs of the physics lecture room at the Institute of Technology, Boston, which was arranged to be lighted through either ribbed or plain glass, the transfer being made very quickly. It is a typical case. Every precaution was taken to make the comparison a fair one, and in over two hundred negatives every one showed that the room was better lighted with ribbed glass than with plain glass of the same area. The two photographs do not show as great a difference as does the eye. Take, for instance, the apparatus case in the upper left-hand corner. Where ribbed glass is used, it is possible to distinguish and recognize the separate pieces with a very small window. When the same window of plain glass is used, one cannot even see that there is any case there. In the photographs the windows are behind the camera, as is shown by the strong light on the lower corner of the "plain" exposure.

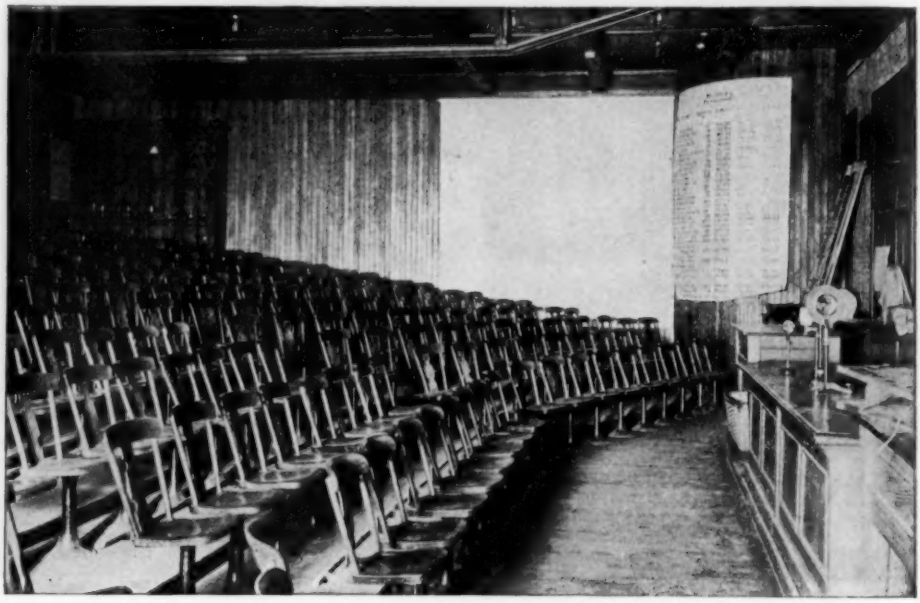


PLATE II—RIBBED GLASS.

"Plates III and IV show a long, nar-

row room, lighted only from one end, behind the camera. The gain derived from the use of the ribbed glass here is too marked to need extended comment.

"Taking now some special cases where ribbed glass may be used, we have first and foremost the factory. Here it is usually the convenience of setting up the machinery and the possibility of getting the greatest number of operatives in the smallest possible space, rather than the suitable light for each person's work, that decides the questions of position. He who is

value as a protection to the welfare of our eyes. No one need now have the sun streaming in upon his book, and no one need sit in a dark corner. We have practically bent the clear sky light-rays so as to turn them upon every desk. Laboratories fitted with ribbed glass windows allow of all the work that can be done in those fitted with plain glass, and, further, give the side of the room farthest from the windows much more light. The eye does not tire as readily over very fine work in the diffuse light coming from ribbed glass.

PLATE III—PLAIN GLASS.

near the window needs a shade. If he gets it, he immediately cuts off light from the entire room, in order that his bright spot may be darkened sufficiently. But, on substituting ribbed glass for the plain, the effect is the same, as far as one near the window is concerned, as is the case when a shade is used, and every one else is greatly benefited, instead of harmed.

The gain arising from the use of ribbed glass in a school-room is sufficient to necessitate the immediate use of it in all cases. The soft, even light which fills the room, leaving no desk or book untouched, is of inestimable

"A prominent manufacturer of colored fabrics is reported as saying that the caprice of fashion often compels him to use colors which fade. Even during the operation of finishing in the mill, there is danger in bright sunlight. He says that he has been able to use, since his windows have been glazed with ribbed glass, much room which otherwise was useless, because of the too strong sunlight. If he used shades, the quality of the work done on the machines farthest from the windows fell off at once, because the operatives could not see small imperfections readily. The color of the

light coming through the ribbed glass is not sensibly altered, and matching colors may be done as readily as behind plain glass. Ribbed glass gives a strong and uniform light for exhibiting pictures, and its use in art galleries should be much more general than it is.

"In using 'factory ribbed' glass it is best to set it with the ribs running vertically, as otherwise, when the sunlight strikes it, it is too dazzling for the comfort of the eye. Exception may be taken in cases where the sun never strikes the panes, and it is recommended to use it with horizontal ribs in basement and cellar windows, where the brightness of the glass does not matter. It is, by the way, in low basements, lighted by small windows, that one appreciates to its full measure the gain in illumination due to ribbed glass.

"Oftentimes, when it is not deemed wise to glaze the whole window with ribbed glass, one or two panes, or the entire lower sash, is left with its plain glass. Several factories are so equipped, to the apparent satisfaction of the operatives.

"What is true of light dispersion is true of heat as well, and, while the temperature of the room as a whole is not changed, the direct rays of the sun, which may render work in a part of the room intolerable, are spread by the ribbed glass throughout the whole room. This, too, helps the cold corners in bright winter weather.

"The fact that ribbed glass is cheap, that it can be had in large sheets, and that it is stronger than ordinary glass should help to make its use more common. It is heavier than ordinary window glass and requires a heavier sash. For ease in keeping the glass clean, the ribs should be on the inside; and, in case double glass is used, the ribs of the two sheets should be crossed and placed toward one another. The 'wire' glass, consisting of a ribbed glass with a wire netting imbedded in it for purposes of fire resistance, has the same optical characteristics as the ordinary ribbed glass, and is of great value for skylights and air shafts."

PLATE IV—RIBBED GLASS.

—The number of men employed by the railways of the United States on June 30, 1897, as reported, was 823,476.

From Chemnitz.

HOME INDUSTRIES—THE EASTERN TRADE

Any one who has read of what ancient weavers, men and women, were wont to put into their products must approve and applaud the article in your July number under "The Revival of Hand-Loom Weaving." One of the great economies of all Continental people is the utilization of time; not so much for the value of the things produced as for the habits acquired. Were the American people to weave, knit and crochet as women and children knit, crochet and weave here, less would be heard of the "longings for life work." Lyons, the world's great weaving centre, knows little of huge mills like those of Lowell, Lawrence and Fall River. Many of the marvellous silks, sent to your country, come out of very humble homes. Carry out, if you can, the suggestions in that article. Get Vermont, New Hampshire and the hill towns all over the United States to take up the house industries such as are seen here, in France, Belgium and other Continental countries, and you will do much to make life on your farms, especially during the long winter, enjoyable. The possibilities along these lines are enormous. Is there any good reason why women in your country cannot combine yarns, colors and combinations as well as the women of Persia, India and the East? Instead of the wretched rag carpets, so hideous in hundreds of homes, they might have self-woven rugs equal to any except the very old and artistic products of the East. Wisconsin's and all your Western woods might have house industries like those of Germany's mineral mountains, the Black Forest and the Harz. Toys of all kinds, beads, glass ornaments, musical instruments, etc., etc., are made here in the hills. Hundreds of homes here in the hills, far from maddening crowds are hives of human industry.

If you are to be all that is best or all that is possible, you must put before your people the infinite possibilities that lie neglected. Unless our lives are to be living lies, unless what we preach is mere prating, a something for others to practice, not ourselves, we must urge the millions of people to make the most of their wonderful opportunities.

Not only "to revel in the forest silence," but to catch beauty and happiness from nature's face in its thousand moods, is the mission of men, women and children. We must carry children out of the cities into the country. A good way to begin would be by keeping the country children out of the cities. The artistic elements in Oberammergau are possible to every hamlet in Vermont's hills. Nor is the perfection of the Passion Play, the Bavarian villagers' highest art. The wood carvings, telling the Christ tale as never told before, are dramatic too. How much they contribute to the success of the Passion Play itself it would be hard to say.

There is a war coming worse than that of tariffs, worse than any that began, or is ending this century; a war of the world for participation in Eastern trade. It will be Europe on one side with Russia against England and ourselves. If we are to win the place nature and nature's God have marked out for us, we must make the most of the many advantages at our doors. Half the human race is to come into the circle of European and American influence. If we are to go on making only the coarse grade goods, leaving to Europe those of a higher grade, we will be unworthy of our advantages.

ARISTIDE.

Chemnitz, Saxony.

—The number of passengers carried during the year ending June 30, 1897, as reported, was 489,445,198, there being a decrease of 22,327,539 as compared with the year ending June 30, 1896.

—According to a report from the English vice-consul at Fez, the cottonades manufactured in the French factories of Pondichery are supplanting Lancashire products in Morocco.

Cotton Press.

Cotton presses, harvesters, and other implements applicable to the culture of cotton, are being constantly invented, some of which prove to be valuable in some of their features, others complete failures. The cotton press seems to receive more attention at this time than anything else, with the object of improving the form and compression of cotton for transportation. There has recently been invented, with alleged meritorious features, a cotton press which is capable of taking the cotton right from the gin or condenser and compressing it into a bale of great density and of substantially rectangular shape. It is said to be simple in operation and economical of power so as to be adapted to the use of the ordinary cotton-gin operator.

It is now the usual practice for the producer or gin-operator to bale the cotton in large loosely-packed bales, such as are capable of being made by direct compression in the small and comparatively weak presses at his command. These bales being then shipped to central points are compressed by large and powerful compressers to the size and density required for shipping or storing.

The advantage of direct compression at the point of production to the density requisite for final shipping and storing has been well recognized, as it leads to great saving in freight, rehandling, and storage and obviates also losses due to exposure of the loosely-packed bales to the weather and to theives.

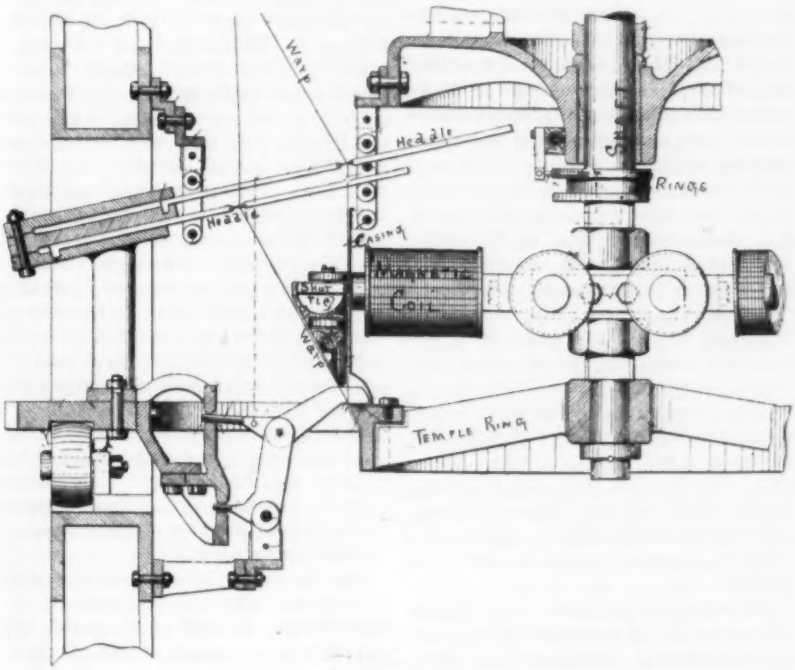
This machine first compresses the bat as far as possible by passing it between rollers, then lays and folds it into the press-box, and after each lay or fold compresses it by a direct pressing or tramping action. The laying and pressing agencies thus operate alternately and not in conjunction, so that the laying is accomplished without friction and the pressing is effected by direct thrust and not by a rolling or sliding action. As the bat is folded and then compressed, layer by layer into the box, the bottom of the latter is gradually lowered, so as to leave room for the reception of the next layer. When the box has been packed full in this manner, the bale is given a final compression, and temporary clamping devices are then adjusted to the bale, which is then removed from the press and secured by the usual ties or otherwise. These temporary clamping devices being quickly applied, the stoppage of the machinery is lessened and the continuity of the operation furthered. There is thus obtained, it is claimed, a bale of a density equal to or greater than the ordinary compressed bale and of the same shape as the ordinary bale. As the air is pressed from the bat and from between the several layers of the bat successively and from one part at a time, it can be much more effectually removed than by direct compression in bulk, and the resulting bale is therefore comparatively inelastic. For this reason and as the compression is effected in numerous successive stages but little power is said to be required. The machine is an adjunct to a cotton-ginning plant.

Circular Electric Loom.

Electrical devices for moving machinery are coming more and more into use, some of which are especially ingenious. We think there can be but little doubt that the motive power of the future will be electricity, carried to the minutest forms of mechanism, and doing the most delicate operations. Electricity has already been applied to weaving, and has come into much prominence in the running of silk looms in Southern France. Nothing has been accomplished elsewhere of any moment, so far as we know. There are isolated cases where machinery of this kind has been operated, but nothing on what may be termed an extensive scale. We have never seen any practical demonstration of the circular loom showing any superiority over a straight loom, therefore, we are unable to pass an opinion upon the intrinsic value of a recently

invented circular loom, the shuttle of which is operated by electrical currents, as the result of the ingenuity of an Austrian.

We illustrate, herewith, a vertical section of a part of the loom, showing the entire arrangement for the opening of the shed, the arrangement of the shuttles, and the lever arrangements for beating up the weft threads. A fair idea of the principal mechanism of this loom can be obtained from this illustration. One of the objects, and



ELECTRIC LOOM.

the principle one, of the loom, is to obtain a greater amount of cloth without an increase in the motive power, than by the ordinary, or any other circular, power loom. In the loom which we present here, its object is accomplished by several shuttles working simultaneously on the same web, while the formation of the shed, the propulsions of the shuttles, and the beating up of the weft threads are carried on without intermission. The most important arrangements of this loom are the opening of the shed, the shuttles, the lever for beating up the weft threads to the web, the weft guard, and the driving arrangements.

The shuttles are made of some light material—such as wood, paper, etc.—are suitably adapted in shape to the box, which is round and at the bottom runs to a point, and are provided with a cavity for the reception of the cop or spool. On the side which is turned to the casing the shuttles are fitted with a metal plate (iron) for magnetic effect and run with pairs of rollers over the warp-threads adjacent to the casing.

The rotary loom works as follows: When the warp-threads are drawn, the shed formed by the heddles, and the shuttles put into the box, the magnet is energized by a current that passes through a wire. During the rotation of the shaft the stationary contact springs slide without interruption against certain rings, so that the magnets are constantly energized, and the shuttles are carried along with the motion of the shaft by the continuous-

ly operating attraction of the electromagnets, which causes them to run along the race and insert the weft-threads.

Peurto Rico.

COMMERCIAL RELATIONS WITH THE UNITED STATES.

As the island of Puerto Rico has virtually become a part of the territory of the United States, makes a consideration of the access of trade which will accrue to manufacturers of textiles from the deposition of Spanish authority there, interesting at this time. As has been pretty well understood, Spain's policy toward her colonies has been not to allow other nations to sell them goods that she could supply, therefore, it is not surprising to find that out of a total of $2,070,667 worth of cotton fabrics imported into Puerto Rico during the calendar year 1895, Spain's share of the trade amounted to $1,415,006. The value of the goods manufactured of cotton, including colored and un-colored cloths, wearing apparel and miscellaneous imported from this country during the calendar year ending with June, 1895, was $14,480. It may be mentioned here that the value of these goods increased in 1896 to $36,543, but only to decrease again in 1897 to $12,002.

The foregoing figures are taken from the official compilations of the United States Government. The British Consul at Puerto Rico reports upon the condition of trade as follows, dealing with the year 1894, no later statistics being available: "The increase in the imports of cotton stuffs is estimated at 958 tons. There had been a falling off since 1891 but in 1894 cottons regained lost ground. Spain still holds the first place with 1521 tons valued at £407,852, an increase of quantity of 751 tons or nearly double the amount furnished in 1893. Great Britain continues second with 905 tons valued at £184,303, an increase of 240 tons. France increased from 19 tons in 1891 to 25½ tons in 1894, valued at £7,422. The United States furnished 16 tons as against 60 tons in 1893; Germany 13 tons, an increase of 2 tons, and Belgium contributed 2 tons valued at £266."

The value of the woolens imported into Puerto Rico during the calendar year 1895 was $154,947. According to the figures of our Government, Spain sent in nearly one-half of these goods, at a valuation of $61,399. The value of the manufactures of wool furnished by the United States during the fiscal year ending in 1895 was represented by the large figure of $147, of which $40 was for carpets and $107 for goods other than wearing apparel. Our exportations to the island of the same class of goods for the fiscal year ending in 1896 was $195, and during the fiscal year ending in 1897 was $57. This is the British Consul's report on the same subject, a gain for the year 1894: "There was a decided increase in the imports of woolens. Great Britain furnished 36 tons, an increase of 2 tons as compared with 1893; Spain follows with 30 tons, or 17 more tons than in the preceding year; France comes next with 9 tons; Germany sent 7 tons; and the United States 1 ton." According to our reports of 1894 there was not even one pound exported to Puerto Rico that year. The total value of the imports into Puerto Rico of woolens during the calendar year of 1894 was $262,648.

The Puerto Ricans purchased silk fabrics in 1894 to the extent of $202,850 and in 1895 to the value of $98,786. Spain supplied $72,159 and $14,143 worth of goods respectively; the remainder coming from Great Britain, Germany and France.

Since the prospects of the island becoming United States territory first became likely, inquiries have reached the Philadelphia Commercial Museum from manufacturers of textiles as to the probabilities of an extension of trade to the island; the suitability of the place as a location for cotton and other mills; the character and disposition of the people and the probabilities of their susceptibility to training as operatives; and regarding the water power, transportation facilities,

fuel supplies, etc., of the island. Some importance has been placed, too, on the climatic conditions of the country, and inquiry has been made as to the suitability of the soil for cotton growing.

There is no doubt at all that cotton can be cultivated on the island. In fact, a species of cotton grows there in a wild state. One of the peculiarities of the island is the variety of its soil, being sandy, silicious, calcareous and loamy according to the locality and altitude, and which is therefore suitable to all kinds of cultivation. The soil too is extremely rich, as much so on the high plateaus, which are now occupied as magnificent pasture land, as on the lower lying ground which encircle the island between the foot hills of the mountain range and the coast line.

The very fertility of the soil, rendering it easy to raise crops on it tends to increase the natural lassitude of the natives. They can gather a living so easily from the field that there is no necessity for them to "labor." They are, however, docile and intelligent, and presumably from the admixture of Spanish and French blood in them, could be made as capable workers as the mill hands of continental Europe. The presence in the island of a strong French colony, the number being about 3,000 persons, would have a helpful tendency, by example, towards the upraising of a class of mill operatives.

In the establishment of factories on the island the climatic conditions would of course become a consideration. While the temperature rarely exceeds 85°, the humidity is very great, and so as to acclimate themselves, new comers are advised to go there in the months of November, December, January and February. Yellow fever and black water fever, called by the natives, vomito, are very prevalent throughout all parts of the island. Vomito, or "black jack" as the sailors call it, is the worst variety of malaria and is almost as dangerous as yellow fever. Whether science can eliminate these pests has to be demonstrated.

The island possesses one advantage which is material for manufacturing purposes. That is in its strong, though not very lengthy, rivers supplemented by numerous streams and water courses. From these, ample power for the generation of electricity could be obtained, and as the island is compact as to its area, it is not difficult to conceive the entire electrical requirements of the island generated from one or two large water power plants advantageously situated. Coal is said to exist on the island, but no attempt has ever been made to ascertain its extent or quality.

As far as geographical position goes, future mill owners of Puerto Rico would be in an admirable location to command certain markets. We have seen that Puerto Rico pays over $2,000,000 every year for cotton goods, while Cuba purchases them to the extent of nearly $5,000,000 annually. The neighboring island of Haiti purchased cotton goods in 1895 from Great Britain to the value of $1,103,330, and from the United States to the value of $529,479, and Jamaica's purchases for 1896 amounted to $133,235. In this limited territory alone there is a market which should be entirely at the mercy of any Puerto Rican manufacturer, and the facilities for reaching other markets would be as good from Puerto Rico as from elsewhere, at the least. One result of the war at least will be to throw open to the competition of this country and Great Britain, the share of the trade in cotton goods which Spain arrogated to herself with Cuba and Puerto Rico, our exports to the former in 1896 amounting to $3,744,257 and to the latter $2,487,953; in the same year the United States exported to these islands respectively $463,834 and $36,543. France exported to both islands, goods to the value of $80,057; Germany goods valued at $36,000 while England sold them goods to the value of $1,126,306.

—The total railway mileage in the United States on June 30, 1897, was 184,428.47 miles, there being an increase of 1,651.84 miles, or 0.90 per cent. during the year.

Chemnitz Knitting Industry.

Knit glove mills are on full time, turning off goods for next winter. Repeats are coming in from all quarters, by post, telegraph, telephone and cable. Ringwoods appear in almost every repeat. Everything indicates a good summer season, for 1899. The prospects were never better. No one looks for a dollar less in exports or home trade than in the year just ended. England and France are sending big orders for high class goods at high prices. This has its effect. Silks, half-silks, lisles, satins and woolens (cashmeres) are all running. Buttons (3, 4 and even 5) and clasps are in favor. Taffetas too, and imitation taffetas were very much wanted.

The barometer by which the hosiery people measure the present and the prospects of the future is the war. No report is ever issued until the outlook or outcome of the war is considered. After Cavite, buying was active, after Santiago more so. Recently it fell off. Fancies are bought; but in such insignificant quantities that it hardly pays to book the orders and put up the goods. Buyers say they will order from the other side. Will they? Only very pretty fancies can go for a long time. Fine stripes, with dark bases have the preference. Fine blacks, navy blues and browns beautifully embroidered are selling too. Scotch plaids and tamboured goods are hard to get to go at any price. Too much rubbish was dumped over there during the 365 days of the Scotch plaid run. Sport goods dragged a bit because of the bad weather. Big orders in staples were offered but at prices that precluded profits. Manufacturers preferred to wait, hence refused, that is to say, the best manufacturers. Rumor has it that one or two houses "chanced" them; but on what basis is a mystery. Canada bought hardly any goods, the United States "from hand to mouth," South America also few. England bought big lots for the colonies, but very few for the home trade. Continental and Oriental houses ordered heavily. On the whole, things "ain't so bad but they might be worse."

The recent return to good weather has worked wonders, for underwear. Sport goods, that hung a bit heavy, began to move again. Repeats came in quite frequently, enough so to light up the countenances of those interested. The damage done by the long continued bad weather of late spring and early summer can hardly be repaired, even if August and September should have sunlit days and moonlit nights. Formerly, the export trade was an excellent "stop gap," for any falling off in Continental or home trade. This is at an end. Only regular full fashioned goods go now; and, of these, particular kinds. Cut goods fall off more and more. Houses that once did a big business sell to the United States no longer. Goods made from mercerized cotton are in every collection of samples. They look enough like silk to deceive everybody, even experts, for a moment. Even washing does not do away with the silky "feel" and finish. Germany is looked to for large purchasers in this line. Whether it will go in the United States and other foreign parts, is a question. Customs collectors and appraisers have been baffled by these wares, rating them as real silk.

BROWN.

Chemnitz, Aug. 10, 1898.

Mercerizing Apparatus.

Mercerized cotton yarn and goods have come into fashion with a jump, and are meeting with much popularity, as they deserve. The commercial value of the mercerizing process is in mechanical devices which will keep the yarn or goods under tension, so as to prevent the great shrinkage that they would otherwise be liable to. Many of these devices are of doubtful utility, and certainly are not worth the payment of a royalty where they are patented.

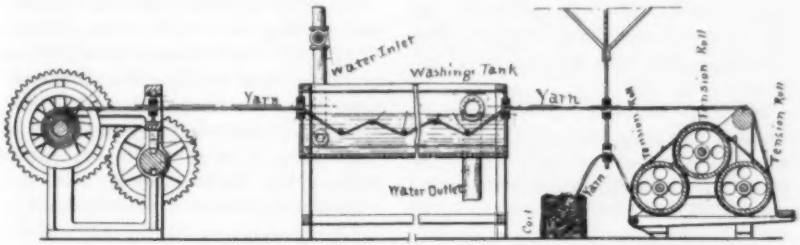
We illustrate, herewith, a mercerizing apparatus for preparing warp for dyeing. This illustration will be self-

explanatory, and our readers can judge for themselves whether it posesses any meritorious features.

It is known that if the vegetable fibre be treated or subjected to the action of strong alkali (caustic soda) the fibre becomes changed, so that it has a greater affinity for the dye, and also its structure is changed, so as to make it finer in texture. This treatment with alkali, however, causes a certain shrinkage of the yarn, generally about one-third. This is caused by the excess of alkali. Generally speaking, this is cured by restretching the material when in a wet condition and simultaneously therewith removing the excess of alkali, whereby the material is first brought to its original length, and when so stretched the excess of alkali is removed therefrom, and it is maintained in its stretched condition until it is set. Subsequently it is treated by the dye.

The apparatus here illustrated has for its object, after the yarn has been subjected to an alkali treatment, of bringing the yarn back to its original length and the excess of alkali removed and the yarn maintained stretched until it is set.

Speaking generally, it consists of a tension device, a warp-beam, and intermediate thereto a tank or washing device, the warp or yarn passing around the tension device, through the tank or washing device, onto the warp-beam, so that by the movement of the warp-beam the yarn from a coil is drawn around the tension device, through the washing device, and onto the warp-beam, and is maintained in its passage through the washing machine under a tension and upon the warp-beam under tension until it is set.



MERCERIZING APPARATUS.

Unrolling the Round Bale.

One of the difficulties in using the cylindrical bale as made by the American Cotton Co., is that attending the unrolling of the bale at the mill for mixing purposes, or for placing upon the picker. There have been a number of crude contrivances, though in a measure effectual, in overcoming troubles of this kind. An apparatus has now been invented by Lowell parties, for unwinding such bales, prior to the introduction of the cotton to the usual picking machinery. By means of this apparatus, it is said that a continuous and substantial uniform bat is rapidly removed with a minimum of handling and labor. There are already devices by which a lap of cotton can be unwound, by means of a carrier, depressed between supported drums or rolls, operating in connection with a heavy iron core or arbor driven into the centre of, or on which, the bale is wound, to insure unwinding. This apparatus, however, is expressly designed to avoid the use of such a core or arbor, which has heretofore been customary to drive into such bales, preliminary to unwinding them on an ordinary horizontal travelling apron.

—The total number of locomotives in service in the United States on June 30, 1897, was 35,986, the increase in number as compared with the preceding year being 36.

Wool Market.

There is very little being done in wool at the present time, dealers finding it almost impossible to interest manufacturers in the lots which they may have to offer. Prices are nominal rather than otherwise, though wool is looked upon, generally, as being good property to hold, as there is not the slightest indication of conditions, either here or abroad, that will affect the prices on to a lower basis. There is in the hands of manufacturers a small amount of the wool that was imported before the present tariff, but very little of it, so far as we can learn, remains in the hands of dealers. The statistical position of wool is excellent. The advance in the values of wool within the last year, aside from any artificial advance that it may have received from the tariff, has been about twenty per cent.

The next series of auction sales at London will take place on the 20th of this month, but as this series is usually for clearing up odds and ends, very little interest is anticipated for it. XX and above Ohio and Pennsylvania fleeces are steady at 29 to 30 cents, with No. 1 at 30 cents. Wools that are held in the interior by farmers cannot be moved except at prices which show no profit to the dealer.

Recent advices from Goldsbrough, Mort & Co., Melbourne, Victoria, state that during the month of June, more copious and general rainfall than has been recorded for many years has visited the whole of Australia, thoroughly ending, for a season at least, the drought which over the southern half of the continent has prevailed throughout the year. Accompanied as it has been by mild, growing weather, the recovery in the pastoral position has been most rapid. As far as a large portion of the wool clip is concerned, the ill effects of the hardships undergone will doubtless be manifest, and there has been much irrecoverable loss; but the wonderful recuperative powers of both land and stock have been so generously fostered by the weather which has recently prevailed that the pastoral position is one of unexpected promise, and the agricultural aspect revolutionized. Respecting the lambing, very sparse reports are yet to hand. In the nearer districts to Melbourne, progress has been retarded by the inclemency of the season, and few returns have yet been received from the more distant stations. Some varying results are reported from Riverina districts, but it appears probable that the ultimate returns may prove somewhat better than expectations, while it is generally anticipated that throughout the Northern districts of New South Wales and in Queensland an average lambing will be recorded.

Cotton Market.

We quote middling uplands, at present writing, at 5 3/4 cents, against 6 1/16 cents last month. This decline in price is due to the general listlessness in the cotton manufacturing business, and also to the prospect of a large surplus of cotton for the next season. The trade is pretty well convinced that there will be another crop in excess of wants for the season just commenced, and although it is too early to predict the number of bales that the crop will yield, it is quite evident that there will be an ample supply, and it would not be surprising if another eleven-million bale crop was the record for 1898-99. Climatic conditions, however, have much to do with the final yield, and as the crop is looked upon as being two weeks behind that of last year, the probabilities seem to be that on this account alone there will be a loss of 500,000 bales. At any rate, spinners are apparently willing to accept contracts for yarns and goods without protecting themselves in the purchase of cotton, feeling assured that when they are required to enter the market for their raw material that they will find it no higher, at least, than it is at present.

According to reports from Alexandria, as given out by Stoddard, Haserick, Richards & Co., Boston, Mass., the

new Egyptian crop is prospectively everything that can be desired, and unless unfavorable conditions should exist during the next few weeks, there is no reason why the quality should not be fully up to the standard.

The most interesting thing that has transpired within the last month is the circular of Henry Neill, the well known cotton statistician, in regard to the present growing crop. According to Mr. Neill, the promise today is equal or superior to that of last year at this date in every State, and vastly better in Texas, which State has had bad weather conditions equal to those which produced the enormous crop of 300 pounds per acre in 1894-95 and this product applied to the present Texas acreage (6,750,000 acres, including the Indian Territory) might result, with equal conditions hereafter, in a crop for Texas and the Indian Territory of over four million bales, while for the other States a crop equal to the past year would be over eight million bales. I have, therefore, no hesitation in saying that the promise of today, even with somewhat unfavorable conditions hereafter, is for a crop of over ten and a half million bales assured with a million to a million and a half more within the range of possibility. In addition to this vast supply we shall carry over on September 1, 1898, visible and invisible, fully one and a half millions more than the supply, visible and invisible, on September 1, 1897.

—In Germany and Austria, complaints are made that the cotton industry is no longer profitable, by reason of overproduction and the competition occasioned by the introduction of new machinery. During the last season, about 500,000 new spindles were worked in Germany, and spinning mills with a capacity of from 300,000 to 400,000 more were being built. In France, also, there is overproduction and less demand. Taking the Continent as an entirety, an increase in consumption is noted, corresponding to the inauguration of 1,000,000 new spindles.

Changes in Cotton Mills.

In the progressive changes of the last fifty years, fans and dust flues have made picker rooms as pleasant as other parts of the mill. Eveners and feeders now make more uniform laps and better work than was possible by the most careful weighing of cotton and spreading it by hand. Cards with wooden frames, wooden cylinders and no licker-ins have given way to the modern revolving flat card, which can be accurately set to the nicety of one-thousandth part of an inch. The old drawing frame that had to be watched all the time is replaced by those with stop motions incapable of making a mistake. The old speeder would cut a sorry figure in competing with the elegant fly frame of today. The old dresser frame did well to dry fifty cuts per day, while the modern slasher will dry 350 cuts a day, and do it much better.

—To spin fine counts successfully, a better material of leather must be used all through than is necessary for the coarser counts, and the leather used on the rollers for fine numbers is often the best Persian skins, though sometimes the best Welsh lamb skins are used with success. For the coarser counts, such as 24's, sheep skins or the rougher and heavier kinds of Welsh skins are used; the cloth, which is put on the roller before the leather, is different also; a better and finer quality is used for fine counts. A cloth of about 9 to 10 oz. per yard is suitable for fine counts, and a cloth of about 12 oz. per yard for coarse counts. —Exchange.

—On June 30, 1897, the amount of railway capital outstanding was $10,635,008,074, which, assigned on a mileage basis, shows a capital of $59,620 per mile of line. The amount of capital stock was $5,364,642,255, of which $4,367,056,657 was common stock, and $997,585,598 preferred stock. The amount of funded debt was $5,270,365,819.

COTTON DEPARTMENT.

American Cotton Spinning Machinery.

CHARLES CLIFTON HEDRICK.

Article V.

(Copyright.)

The operations of the evener, on the intermediate and finisher pickers, depend wholly upon the thickness of the sheet of cotton, which passes between two surfaces, and not upon the weight, as is also the case when the evener is applied to the automatic feeder, and, unless the cotton has been thoroughly opened, the same weight in a lap may be slightly different in thickness, thus the evener is not always absolutely perfect in its work.

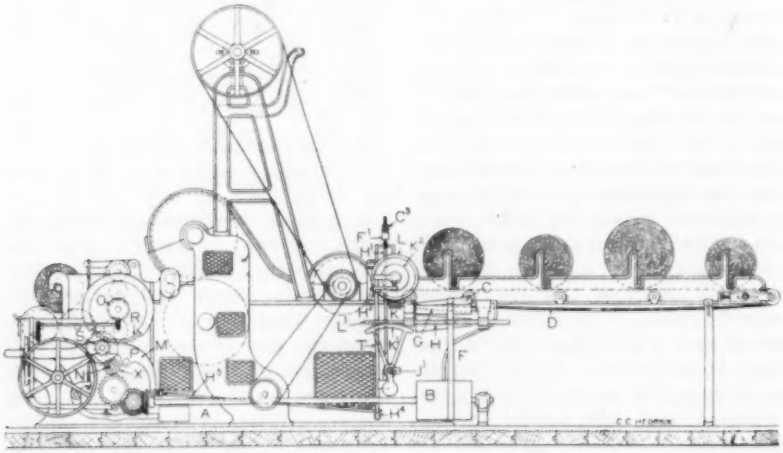


FIG. 26.

A side elevation of a finisher picker, provided with an evener, is shown in Fig. 26. The evener is driven from the draft gear, "X," on the calender head, or delivery end of the machine, by the side shaft, "A." On the back end of this shaft is a drum, "B," which drives the evener cone, "C," by means of the belt, "F." This belt passes over the carrier roll, "G," and under the binder cone, "H," which can be lowered for taking up the slack as the belt stretches. On the end of the evener cone is a worm, "K," which drives the worm gear, "L," which is connected directly to the evener and feed rolls.

Fig. 27 shows a section through the evener and Fig. 28 shows a side and end elevation of the same. The laps are carried forward on the feed apron, "D," and are drawn between the evener roll, "J," and the sectional plates, "E," then between the feed rolls, "N'" and "N²." These sectional plates, of which there are sixteen, extend across the whole width of the face of the evener roll. Resting in a socket, on the top of each of these plates, are short rods, "B¹," which support saddles, "C¹." These saddles are connected to the stem, "D¹," by other and larger saddles, all of which act as levers, the stem forming a connection between the top saddle, "E¹," and the top lever, "F¹." This top lever, which has its fulcrum at "G¹," is connected at its long end by a rod, "H¹," the lower end of which terminates in a rack, "A¹," which is in gear with a pinion, "C¹:" the latter being on the

quadrant shaft, "J¹." On the outer end of the quadrant shaft is a segment gear, "K¹," called the quadrant, the teeth of which are in contact with the teeth of the cone belt guide, "L¹."

When the position of the sectional

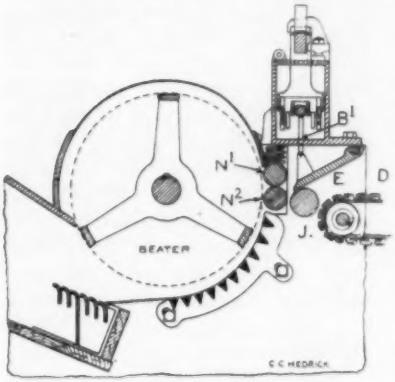


FIG. 27.

plates is changed, by reason of a difference in the thickness of the sheet of cotton passing under them, the quadrant shaft is turned, slightly, and by the connections, just described, the cone belt is moved to a different position on the face of the cone, changing the speed of the evener and feed rolls. This will continue until the thick or thin place in the lap has passed by the sectional plates, when they will return to their normal position. At the top end of the rod, "H¹," is a thumb screw, "C³," by which the position of the cone belt may be slightly changed when adjusting the evener.

In order that the sectional plates shall not rise too easily, a drum, or weight pulley, "C²," is fastened to the quadrant shaft. Around this pulley, and fastened to it, passes a strap, "B²," the lower end of which is connected to a weight hook, upon which hangs a weight, "D²." The sectional plates are, by this means pressed firmly down upon the lap.

The gearing of the picker is so arranged that the feed and delivery of the cotton can be started and stopped while the picker is running. In Fig. 26, it will be seen, that the gear, "R," which is upon the delivery calender roll, "O," is driven from the pinion, "S," which is carried by the drop lever, "M," and that the feed rolls and evener rolls are driven from the draft gear "X," which is on the end of the shaft, "N." Both the pinion and draft gears are driven from the calender pulleys on the opposite side of the calender head and revolve all the time that the picker is running. The drop lever turns on a stud at "P." To the

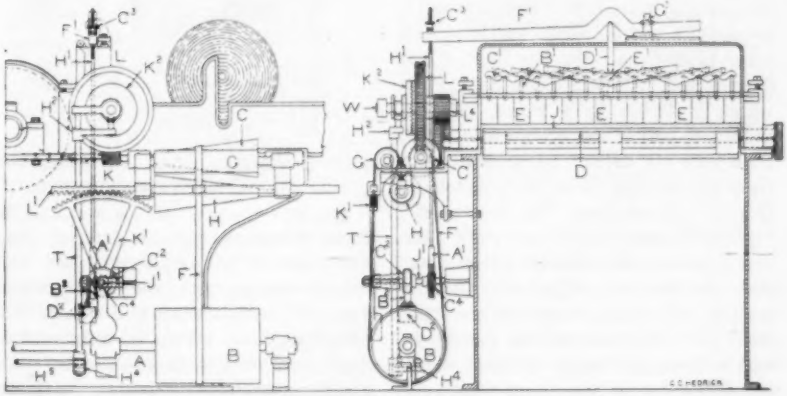


FIG. 28.

lower end of the lever is fastened a rod, "H⁵", which is connected to the lower end of the upright shaft, "T," by the arm, "H⁴." The upper end of this shaft is conected to the clutch, "K²," by an arm, "H²." When the feed rolls are started, the drop lever is raised and the pinion, "S," is brought

into contact with the gear, "R," and at the same time, the evener and feed rolls are started by means of the clutch being thrown into contact with the worm gear.

An enlarged section, an elevation and a partial plan of this clutch and worm gear are shown in Fig. 29. On the stud, "W," is a sleeve, "L^4," with a gear on one end, which drives the evener and feed rolls and a dog, or driver, "L^3," keyed to the other end. The clutch, "K^2," has lugs, or bosses, "N," which project outward, between the arms of this dog. The worm gear, "L," which runs loose on the sleeve, has teeth upon one side which engage with the teeth in the clutch. When the clutch is thrown out, the worm gear runs without imparting motion to the evener and feed rolls, but when the calender head is started, the shipper rod, "H^5", is drawn forward, by the raising of the drop lever, causing the clutch to engage with the teeth of the worm gear, the sleeve being driven by the lugs, "N," projecting out between the arms of the dog, "L^3."

Another style of evener, which is applied to intermediate or finisher pickers, is shown in three views, a section, an end elevation and a partial plan, in Fig. 30. On the end of the evener roll, "B," is a worm gear, "D," which is driven by a worm, "F," on the upper end of the driven cone, "H." This cone is driven by a belt, "J," from the driving cone, "L," which, in turn, is driven from the side shaft, "R," by the gears, "N" and "P." The cotton passes on the feed apron, "A," and between the evener roll and the pedals, "C," then between the feed rolls, "E" and "G." These pedals, of which there are eight, are made with one end a flat surface, over which the cotton passes, and are balanced on a knife blade, "K." To the long end of the pedals is conected a series of links and saddles, which are connected to a main saddle, "M," the whole arrangement being similar to the last evener shown. Directly beneath the main saddle is a shaft, "O," on one end of which is a roll, or drum, "Q," which is connected to the main saddle by a thin steel band, "S," and a yoke, "U." One end of the band passes partially around the drum and the other end is fastened to the lower end of the yoke. On the other end of the shaft is a quadrant, "W," which is connected to the cone belt guide, "Y," by a thin steel band "X," similar to the one connecting the main saddle.

When the position of the pedals is changed, by a difference in the thickness of the cotton passing between them and the evener roll, the shaft, "O," is rotated and the cone belt moved to a different position on the face of the cones. An adjusting screw, "A^1," connects the yoke and main saddle, by which the cone belt may be

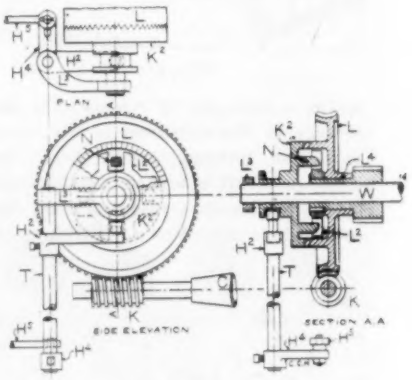


FIG. 29.

moved slightly, when adjusting the evener for the correct weight of lap.

The driven cone, "H," is held rigidly in its bearings, but the driving cone, "L," is held by arms, "C" and "C^1," which swing from the shaft, "D^1." Fastened to this shaft is a lever, "E^1," on the end of which is connected a chain, "F^1," and weight, "G^1," the chain running over a pulley, "H^1." By this arrangement the cones are kept apart and the cone belt tight.

The question often arises as to why the outlines of the evener cones are curved instead of being a straight taper. The reason for this is very simple and, in order that it shall be understood, a few words on the subject may not be amiss.

It is usually customary to double four laps on the apron of the picker, so that four thicknesses shall pass under the evener roll, but, if one of the laps should run out, it is evident that the evener roll ought to run proportionately faster, in order that the same weight of cotton shall be fed to the beater in a given time. A diagram of a pair of cones and an evener roll is shown in Fig. 31. The roll, "A," is 9 inches in circumference or 2⅞ inches in diameter. On the end of it is a worm gear, "B," of sixty teeth. This gear is driven by a single threaded worm "C" which is on the upper end of the driven cone, "D." The driving cone, "E," runs at a constant speed of 480 revolutions per minute, and is driven from the side shaft, "H," by gears, "F" and "G." Let us suppose that four laps, each weighing twelve ounces per yard, are passing under the evener roll, the speed of which is eight revolutions per minute; now, as the roll is 9 inches in circumference, there would be fed into the machine 72 inches, or two yards, of cotton weighing 48 ounces per yard, or 96 ounces in all. With the evener roll at 8 revolutions, the cone will make 480 revolutions, ($8 \times 60 \div 1 = 480$), the cone belt being midway between the ends of the cone. Now suppose one of the laps should run out, leaving only three thicknesses, or 36 ounces, passing into the machine, it is evident that the evener roll should increase in speed enough to feed in an equal amount of cotton, weighing 36 ounces per yard, in the same time as when that weighing 48 ounces per yard was going in. To accomplish this, the speed of the roll must be increased to 10.66 revolutions per minute, which will feed in 2.66 yards, and, as the sheet weighs 36 ounces per yard, the total will be, of course, 96 ounces.

To give the evener roll 10.66 revolutions per minute, the driven cone would have to run 640 revolutions per minute, and as the driving cone runs 480 revolutions, it is easily seen that the belt should move to a point, on the face of the cones, where the diameter will be such as to give 640 revolutions to the driven cone.

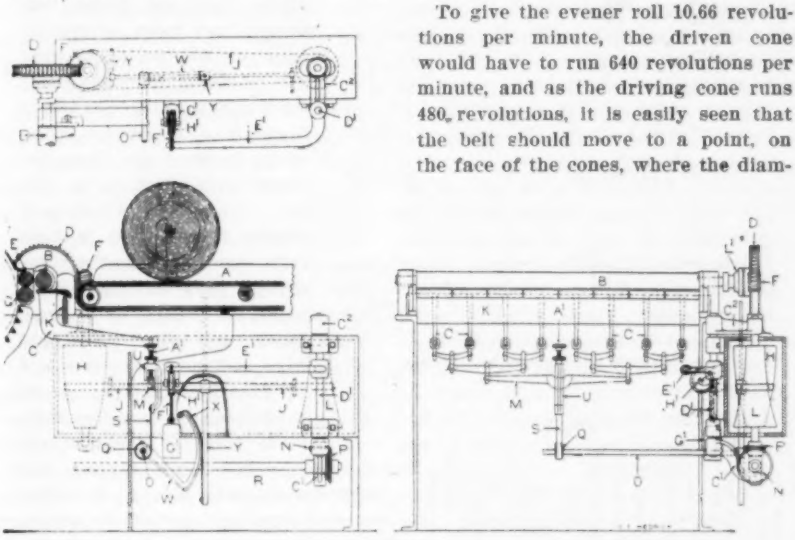


FIG. 30,

The cones in the diagram are made with a difference in diameter between the large and small ends to provide for a range in speed adapted to pass in from two to six laps, and, as the cones are 16 inches long, the difference of one lap in the thickness of the sheet of cotton passing under the evener roll will move the cone belt up or down the face of the cones four inches. Thus, with three thicknesses of laps going through, the cone belt will move down the cones to the fourth position and the speed of the driven cone will be 640 revolutions per minute. The

diameters of the cones, at this point, to give 640 revolutions, should be 5.14 inches for the driving cone and 3.86 inches for the driven cone.

The following table shows the speeds of the evener roll and driven cones and the corresponding diameters of the cones, necessary for the different speeds. From this table, it will be seen that the diameter of both cones, taken at the same points, and added together give the same total.

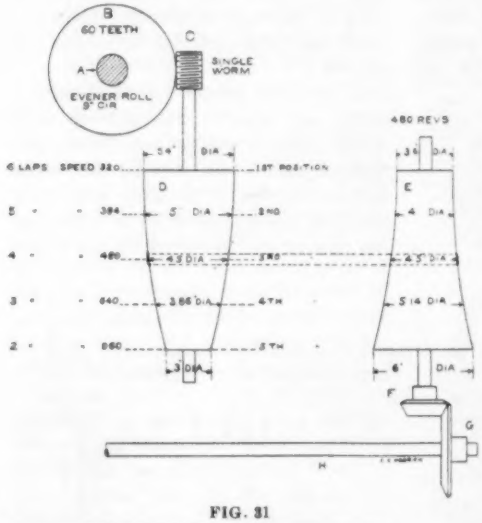


FIG. 31

Weight in ounces delivered by evener roll.	Length delivered by evener roll in yards.	Revs of driven cone per minute.	Revs. of evener roll per minute.	Combined weight in ounces per yard.	Number of laps going through.	Diameter of driving cone in inches.	Diameter of driven cone in inches
96	1 33	320	5.33	72	6	3.6	5.4
96	1 60	384	6.40	60	5	4	5
96	2.00	480	8.00	48	4	4.5	4.5
96	2.66	640	10.66	36	3	5.14	3 86
96	4.00	960	16.00	24	2	6	3

—The total number of casaulties to persons on account of railway accidents for the year ending June 30, 1897, was 43,168. Of these casualties 6,437 resulted in death, and 36,731 in injuries of varying character. Of railway employees, 1,693 were killed and 27,667 were injured during the year.

City and Guilds of London Institute.

ANSWERS TO THE QUESTIONS SET AT THE EXAMINATION IN COTTON SPINNING, MAY 3, 1898.

ROBERT CUNLEFFE.

Ques. 1.—Why are slivers drawn? What faults are corrected, and how? Give full reasons for your answer.

Ans.—The sliver of cotton is formed at the carding engine, and in the case of what is called carded yarn, that is where no combing machines are used, the slivers are taken to the draw frame where they are passed between four pairs of rollers, each pair running faster than the preceding pair; the front roller running about six times faster than the surface speed of the back roller. Thus, for every yard given in at the back, six yards are delivered at the front. This is done three times over, as the same slivers pass through three boxes, or heads, of a draw frame, and thus we should have as the result $6 \times 6 \times 6 = 216$ doublings, or every yard from the card would be made into 216 yards at the finish of the last head or box. But that is not all. The sliver at the finish would be only 1/216 part of the weight of the sliver from the card. But this is not the case really, for at the commencement of the first box, six of the slivers are doubled together, so with six doublings and six of a draft there is very little difference in weight of the finished sliver per yard to the original weight from the card. Then we see the force of the question why are slivers drawn? The object of drawing the slivers is to parallelize and also to equalize the fibres of which the slivers are composed. The carding engine, as at present constructed and worked, can not place the fibres in paralell order, but by placing them between rollers and drawing them out, and this action repeated over and over

again, the effect is that of laying the fibres in parallel order. But yet another object is gained or, as the question puts it, faults corrected, the sliver is made more equal in weight, yard by yard. The sliver from the card will be found to vary in weight; one yard may weigh say 60 grains, another 65 and another 55. Now it will be interesting to see what counts these two extremes would produce in the mule or throttle, if taken through separately. The sliver weighing 65 grains per yard is $8.33 \div 65 = .128$ hank. Then if we had a four-draft slubber, 5 intermediate, 8 jack, 12 mule, with doubling at intermediate jack and mule, we should get $(0.128 \times 4 \times 5 \times 8 \times 12) \div (2 \times 2 \times 2) = 30.7$ hank at mule.

Now if we take the sliver weighing 55 grains through the same rollers we should get $8.33 \div 55 = 0.151$ $(0.151 \times 4 \times 5 \times 8 \times 12) \div (2 \times 2 \times 2) = 36.2$.

Now this would be too great a variation. So what we want is to put these extreme weights together and bring them to what is desired, and by putting 6 of these slivers together and drawing them out we get a much more regular and uniform sliver, with a result that a much more regular and uniform yarn is obtained.

Ques. 2.—Describe generally the construction of a drawing frame, omitting the coiler. How are the rollers constructed? How do you set them?

Ans.—The drawing frame is about the most simple machine in its construction, yet its effects are about the most important of any machine in the whole series. As we have observed in the previous question, there are four lines or pairs of rollers, each pair running at different speeds. The bottom rollers are iron fluted and the top ones covered with leather. A roller beam runs the length of the frame on which are placed stands to hold the rollers; at the end of the frame is a train of wheels to turn the bottom rollers; the top rollers are heavily weighted and run by friction in contact with the bottom rollers. Perhaps the most important parts of the machine are the stop motions. We have said in our last answer that six slivers, sometimes eight, are doubled together here in order to lessen the inequalities in the sliver, but if one of these slivers were broken and the machine permitted to run on, the sliver at the front would be lighter than the sliver where the six ends had been up, which would make a very considerable difference in the yarn. To prevent this, stop motions have been put on to a little brass spoon for every sliver, each one separate from the rest, which slide on a piece of wire. The tail or back part of these spoons is a little heavier than the mouth or front part. So, if any one of the slivers break, the weight is taken from the mouth and the front part lifts up, and the tail part drops, which comes in contact with a rocking arm below, preventing its moving in a horizontal direction and it is forced upwards a little, coming in contact with the strap fork which stops the frame, thus preventing the frame running with five in place of six slivers. Coming to the front or delivery part of the frame, another stop motion is provided, but of quite a different construction. Here the sliver comes out in one piece which passes down a trumpet shaped funnel with an outlet of only about 1/8 inch diameter. This funnel is loose and is kept down by the pull required to draw the sliver through the small aperture. But should the sliver break, the funnel tilts, and the bottom part is brought in contact with the rocking arm below, and stops the frame in the same manner as in the other case. A third stop motion is when the can has got a certain length of sliver deposited in it. This is done by two different methods. Some forms have a loose coiler top. When the can is full the sliver presses the top up, which comes in contact with the rocking arm and stops the machine as in the other two cases; but another firm, instead of having a loose coiler top, has placed at the end of the frame two wheels of different number of teeth. These

wheels revolve until both at the same time lifts the catch, which stops the frame. The rollers are constructed with either loose bosses or loose pivots at each end. This is for the purpose of lessening the great amount of friction, which would otherwise be set up by the very heavy weights hanging from the rollers. The next point is, how do you set them? All draft rollers are set from centre to centre. If, for instance, we had a staple one inch long, the nearest of the rollers should be not less than 1 1-16 inches or 1 1-8 inches, but for convenience the rollers are set by guage a certain distance apart. Suppose we had a roller 1 1-8 inch diameter and the next 1½ inches, what thickness of guage should we have to set these 1 1-16 inch from centre to centre. 1½ + 1⅛ = 2⅝ ÷ 2 = 1 5/16 guage. But the setting of the rollers does not depend entirely upon the length of staple. There are four considerations in setting rollers. First, length of staple, quantity of twist in roving, thickness of substance to be operated on and amount of draft. Longer staple, longer distance; extra twist roving, longer distance; thicker or heavier substance, longer distance; greater draft, shorter distance.

Question 3. What are the means adopted to discover the fineness of a drawn sliver? Give the method of computation used to determine the hank, and say upon what it is founded.

Answer. The means adopted to discover the fineness of a drawn sliver is exactly the same in principle as either the roving or the yarn. That is, by measuring off a certain length, and weighing; the only difference being, that of the sliver, being much heavier, only one yard is weighed at once, whilst with the roving, as a rule, 60 yards or, in the yarn, 120 yards, or one lea are weighed. The method adopted in the case of the sliver is to weigh one yard, or a number of separate yards and take the average and see what is the average weight per yard. Then multiply the number of yards by 7,000 and divide by 840 multiplied by grains which will give the counts or hank. A simpler rule would be, and this refers to any part of the process, multiply the number of yards by 8.33 and divide by the number of grains. Suppose one yard of sliver weighs 50 grains, what is the hank?

8.33 ÷ 50 = .166 hank. The count or hank simply means the number of times 840 yards, which represents a hank, are contained in a pound weight. Thus: .166 hank contains 140 yards to the pound, and 10 hank, 8,400 yards and 50s counts 42,000 yards, and so on, so there are 7,000 grains in one pound and 840 yards in one hank. Therefore counts one, 840 yards will weigh 7,000 grains or one pound.

Question 4. To produce the laps used in combing, what machines are necessary, and what is the principle of their action?

Answer. The combing machine is supplied with laps from 7½ inches to 10 inches wide. These laps are made on a machine specially constructed for that purpose. This machine is often spoken of as a Darby doubler, but this is erroneous. A Darby doubler is a machine for making laps for the finisher card where double carded yarn is made, but the finisher card is going out of date, the combing machine being used instead. When the slivers are taken from the carding engine, they are passed through one head of draw frame, doubling 6 or 8 into one. Then these are placed behind a sliver lap machine, where 17 to 20 slivers are doubled; passing again through draft rollers and between calender or condensing rollers, very heavily weighted, and then wound on a wooden bobbin a block, forming a lap. The principle of their action is, in the first place, to draw the fibres more parallel, previous to presenting them to the needles on the combing machine, to lessen the work, and comb out the fibres easier and better, with less waste than would be the case if they were taken directly from the card; and in the second place to condense or press together the fibres composing the sliver,

so that the sliver will be firmer and more solid, and wind off from the lap without one layer sticking to the next.

The Double Lift Machine.

HOW TO SET THE HARNESSES AND THE JUMPER ATTACHMENT TO RUN A FULL LENO WEAVE ON SAME.

It is only within a few years that the weaving of a full leno or gauze weave was found to be possible and practical on the double-lift machine. I don't know who first discovered it, but am under the impression the idea was first conceived at a mill in Rhode Island. There are many devices used at the present time for the jumper, and a hundred and one ways of getting the same result, the one main object being to bring every harness having any connection with the leno weave to a common level at certain picks.

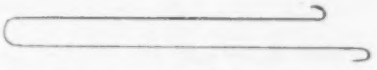
On the single-lift machine, every harness is brought to a level at every pick, and so can do the work better than the double-lift machine. The only objection is it cannot be run at a speed high enough to be profitable in these times. A full-leno weave may be said to consist of two picks, viz., a doup and a crossing pick. On the doup pick one set of threads (doup threads) are raised to the right of the crossing threads for one or more picks, and must be immediately raised to the left of the crossing threads for one or more crossing picks.

As the single-lift machine always brings the harness to a level, the doup thread can be raised either to the right or left of the crossing threads without any trouble. Not so on the double-lift machine, for on this machine there is always an open shed, the harnesses only coming to a level at a point when passing each other.

On a purely leno weave, the doup thread is up at every pick and is never left down for the filling to pass over it, and the crossing threads are always down and are never raised for the filling to pass under it. Hence the necessity for some kind of mechanism that will raise the crossing thread harness to a certain point, and also lower the doup or half-harness to the same point, so that the doup thread can pass under the crossing threads freely in either direction, and then return it on the same pick.

For raising the crossing harness we have a half and return motion jumper which raises the harness half way up and returns it on the same pick. For lowering the doup harness we have another half and return motion "yoke hook," which lowers the doup or half harness half way down and returns it on the same pick.

Having put a warp into the loom and arranged all the harnesses nicely and level, lower the doup set one-fourth to one-half inch lower than the other harness, then raise the harness carrying the crossing threads one-fourth higher than the harness carrying the doup thread. This will enable the doup



thread to pass under the crossing thread in either direction more readily. When the doup set is raised the doup thread is passed under the crossing threads to the left and is called a crossing pick. On this pick, the slacker has to swing forward to give the necessary amount of slack to the doup thread.

Get as high a lift as you can on the slackner lever so as to get more slack yarn than is required. This will enable you to run with the slackner strap loose. Running with the slackner strap loose will allow the slackner to go down quicker than the doup set, and so prevent slack doup threads from twisting around other threads and breaking them out. Have the doup set raise the threads just high enough for the shuttle to pass under and no more, for the higher we raise them the more slack yarn will be required. The jumper should start to lift the harness carrying the crossing threads, when the loom crank has just passed the back centre, and should start to lift the harness carrying the crossing threads when the loom crank

is just passed the the back centre, and should raise the harness one-fourth inch higher than the doup thread harness at the centre of stroke, and must be timed so that the harness will go down at the same time as other harness, and remain down while the shuttle is passing through the shed.

The "yoke hook" is an attachment used for yoking two levers of the dobby together, viz., the lever that raises the standard harness and the lever that lifts the half harness. The doup thread always brings up the doup or half-harness, which must always be up. When the doup thread harness is raised for the doup picks, the half-harness is raised, on the next pick the standard harness is raised, and the half-harness being yoked with it must also come up for the crossing picks.

As it is on these crossing picks that the most strain is thrown on the doup, we should have the half-harness rise a trifle higher than the standard, but don't try to get this by pulling up on the harness strap, for then you would have slack doup when the harness comes to a level. To get this extra lift on the half-harness we must use a yoke with two hooks. The hook that engages with the standard harness one-half inch shorter than the hook that is raised with the first lever of the dobby. It will be readily seen that by using a yoke hook like the one shown herewith we can regulate the length of doup to a nicety; for when the doup thread harness is raised the half-harness will just give the required length of doup, and when the shorter hook is raised with the lever that raised the standard harness, the doup will be loose and so will not wear out so quickly, but will last a long time.

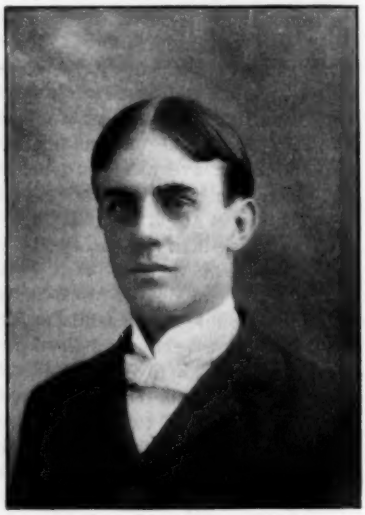
DOUP.

—On June 30, 1897, there were 128 railroads in the United States in the hands of receivers. These roads operated a mileage of 17,861.68 miles, the mileage owned by them being 14,894.57 miles.

William W. Crosby.

PRINCIPAL LOWELL TEXTILE SCHOOL.

William W. Crosby was born in Arlington, Mass., in 1871, and is a son of William and Florence E. (Wyman) Crosby. His father, a Boston merchant, died before he was nine years old. Mr. Crosby received his school education in Boston and Woburn, fitting for the Massachusetts Institute of Technology at the Woburn High



WILLIAM W. CROSBY.

School. He was graduated from the Institute of Technology in the Mechanical Engineering course, in 1893, and returned to the Institute the next fall as Assistant Instructor in Mechanical Engineering, under Professor Peabody, making his specialty that of steam (marine) and mill work. In 1895, he went to Lowell, as superintendent of power and plant for Otis Allen & Son, the latter, Col. Charles H. Allen, now Assistant Secretary of the Navy, who was at that time engaged in extensive building operations. In the fall of 1897, he was elected a lecturer and Professor of Mechanics, Mill Engineering and Mechanical Drawing, at the Lowell Textile School, doing, besides, general engineering work outside. Last July, he was elected principal of the school.

WOOLEN DEPARTMENT.

Ingenuity in Modern Textiles.

CHARLES E. WILES,
Assistant Lecturer in Textile Industries, Yorkshire College, Leeds.

(*Copyright*)

Much may be gained and, should the knowledge seeker possess a sufficient amount of discrimination, nothing need be lost, by studying a few of the various productions which at the close of the nineteenth century occupy positions of favor in their individual departments of the textile trade. But on no account must it be surmised from the superscription attached to these articles that such hints will be found herein as will, for example, enable the far-seeing manufacturer of shoddy ware to produce goods of ultra extraordinary cheapness, because, in the first place, it is highly doubtful whether such hints are at all desirable, and, secondly, the very nature of things would prevent such concoctions being anything but the most confirmed rubbish. The competitive cheapness of textiles in all markets, often with an utter disregard for quality, is being accomplished with such extreme vigor that it at once suggests the necessity of a "complete rest" rather than an impetus.

Nor need it be expected that a lengthy dissertation will be embarked upon which shall be explanatory of the manner of production of certain so-called "ingenious" textiles, fabrications which appear to the level-headed and unprejudiced observer as so many mental abortions and which conduce to the material benefit of only such people as the yarn makers and card cutters. True, these things for a time pass muster, attaining, possibly, a fair degree of popularity, but their life, once the craze passes, is very short, and evidences of their demise are received with unanimous disapproval and attempts at their resurrection generally meet with symptoms of the coldest dissent.

It is not with such that we are concerned, but rather with a type of work more lasting, productions which are the outcome of patient application, skilled intellect and some knowledge, to which the average bystander, omnipresent and generally omniscient, makes reference as affording examples of "genius."

A great deal has been said, and probably more has been written, relating to the loom work and textures of centuries ago and in many instances much has been made of them, but can we, in common fairness, regard such old fabrics in any sort of comparison with, or as examples to, those manufactured today? The conditions are all so entirely different. We can read of them and even study them, but the resulting interest they awaken is one boon entirely of their antiquity coupled perhaps with a vague sort of admiration for the difficulties which their makers must have overcome. Were it necessary to reproduce these, in very few cases indeed should we find the task beyond the imitative skill of present-day designers and dyers, and it would be very deplorable indeed if the case were otherwise, when we consider the wideness inseparable from the appliances of olden times not to mention the relative ignorance of the workers.

For this reason a consideration of the fabrics in vogue at the present time should furnish the greater and more beneficial instruction, and, accordingly, although the extent of the ground to be covered prohibits little more than a passing inspection being made of each department, an effort will be made to include as many as possible of the most typical styles appertaining thereto.

Vestings, being one of the most interesting styles of materials, and embodying as they do, many of the most

important principles of fabric construction, shall receive our first considerations.

A knowledge of the various textile fibres and their special properties and also of weave, color and finish, is shown by an inspection of these goods to be strongly requisite for their production, and especially is this the case where more than one material is employed, or where the texture is of double or treble formation. In the single cloths the largest variety of construction material is permissible, and consequently we notice the employment of cotton, linen, woolen, worsted and silk yarns. The weaves for the cotton and linen makes are practically similar and consist mainly of twills, including small shades, diagonals, satins, hopsacks, and small fancy crossings such as honeycombs and birds' eye effects. One or two types of the most commonly employed crossings are shown at A B C D E F G H I.

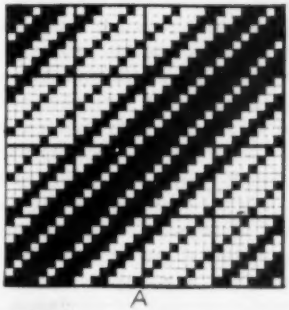
There is little apparent attempt to originate novel crossings for the woolens because the nature of the fibre can be more advantageously dealt with in the operations subsequent to that of weaving, and, therefore, we find the simplest twills with occasional checkings are sufficient for the purpose, a more distinct effort being reserved for the manipulation of the colorings introduced. The seasons for which these fabrics are intended should be a sufficient guide to most in the selection of their color ranges, for a vest, as much as any other article of attire, must convey to the wearer and also the spectator, a sense of appropriate colors in summer and a corresponding feeling of warmth and comfort in winter, and this should further serve as a primary consideration when arranging the remaining requirements and details of construction.

Single make vestings in worsted, however, form a distinct contrast with the woolens, insomuch as the weave in this instance is the more important factor. The various processes to which the fibre is subjected in the manufacture of worsted yarn, all tend to the production of a smoother and neater thread than the rough and fibrous woolen, and it is the freedom from projecting fibre which allows in weaving, the employment of an altogether more complicated arrangement of crossings. At the same time it need not be thought that a weave which has been found suitable for a woolen material would be unfitted to use on a worsted one; far from it. It would probably work equally satisfactorily, but the typical weaves employed in the production of worsted fabrics partake generally of a more elaborate character, though in many cases they are clearly based on the simpler woolen types. During later years, however, the two varieties have been run so closely together in their manufacture that in some instances it becomes no easy task to determine where the woolen ends and worsted begins, and there are plenty of textures which might, with equal correctness, be termed "woolen-worsteds" or "worsted-woolens."

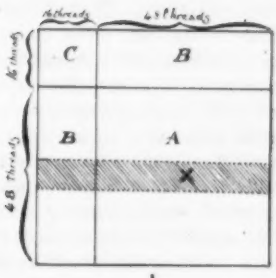
But the worsteds are probably the more popular of the two for this kind of fabric, and neat woven checkings, stripes, broken and granite weaves are mostly used for them, the finishing process generally aiming at clearing the surface of all fibre till the weave effect is sharply defined.

Silk vestings are chiefly of a figure description, the ornamental elements being as a rule, small in character, and marking in this feature the chief point of difference between those of today and the old-fashioned kind. It is impossible here, unfortunately, to particularize on the construction of these goods as they belong to a widely differing branch of manufacture, but some reference may be made to them when that special branch comes under notice.

There is yet one point in regard to these single makes left untouched, and that relates to their extra ornamentation. Very few vestings are seen nowadays without a "spot" effect of some discription, and certainly,


A

B



J

C

D

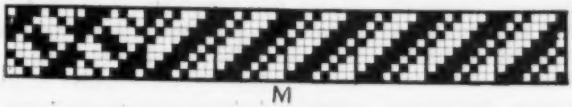
E

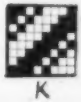
F

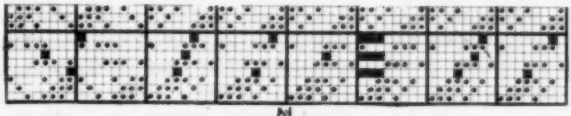
G

H

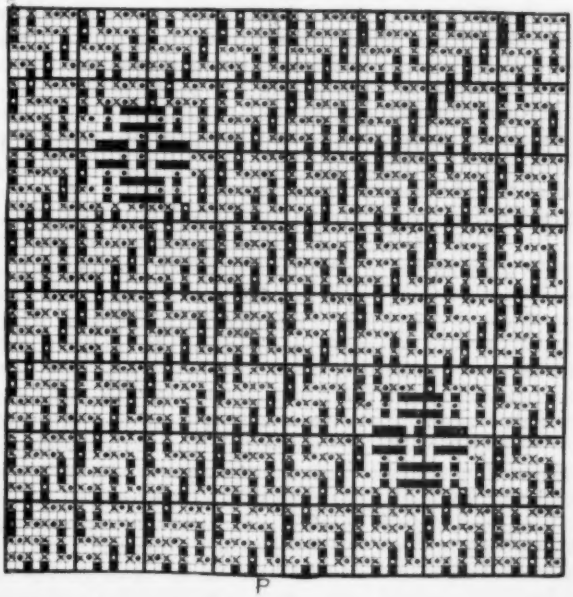
I

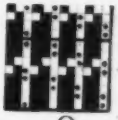

M


K

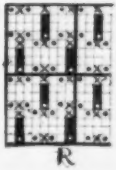

N

L


P


O

Q


R

if happily contrasting color is chosen for it, the introduction of a neat arrangement of spots lends a great charm to the whole. It is possible to obtain a spotted effect by the ordinary warp or weft alone, but when a different colored spot from the ground is required, an extra few picks or threads of the spotting material will have to be introduced every time the spot repeats throughout the length or width of the piece. The most usually adopted scheme whereby this is done is as follows:

Suppose the accompanying sketch "J" to represent the plan for a checked single vesting style. Parts "A" and "C" to be composed of weave it is required to embellish each repeat it is required to embellish each repeat of the check with a small silk spot in the position indicated on the sketch by a cross. As it will only be necessary to modify that portion of the design where the spot occurs, the full design need not be given. But a section "M" of the plan (that indicated by the dotted lines) is reproduced for the sake of clearness.

Now in order to introduce an extra weft the ground weave must be opened out to receive it and the desired size weft ways of the spot (say three picks) will determine the extent to which this must be done. The accompanying section "N" shows the portion with the extra picks added, the ground weave being this time in dots. It will be seen that these "extras" are tied to the texture proper in such places as will hide the stitches, the weft when not in use floating on the back. Another method sometimes employed is to work the silk picks plain for a few threads round the spot to bind them, and then crop away all loose weft on the back; this arrangement certainly obviates the danger of stripes across the piece being formed by the back floats pressing into the cloth and causing marks, when passing through the finishing operations.

With these remarks we will hasten along to the more interesting class of compound and double textures, more interesting because of the greater ingenuity necessary for their correct arrangement, and to obtain the best possible effects and durability with a minimum expenditure. Of the cottons, one type stands out with such prominence as to consign all others to practical oblivion. No great novelty of itself, the cord or corduroy vesting has, by reason of its sound wearing quality, smart colors, and tasteful spottings, obtained a permanent position in the very front rank of all classes of these goods. It is constructed on the principle seen in Fig. "O" which is an example giving a medium sized cord. It should be woven of 2/20s cotton for warp, with 48 threads to the inch, the weft being a finer size (2/36s) to allow for the extra number of picks which are necessary (240). Reference to this design will show that the weft is inserted one pick for ground, and two picks pile, the pile picks flushing over five threads between each binding point, and the ground weave being a common two and two twill. The spottings on these goods are embroidered on after the fabric leaves the loom, by means of a heavy twist silk thread which floats loosely on the back in its passage from one spot to the next. By the bestowal of a modicum of care in finishing, these goods, on leaving the manufacturer's hands, present almost the appearance of silk, so rich is their lustre and velvety their handle. In wear they are almost everlasting. Various shades of brown, from the darkest to medium drab, and also of green are the ones most in request.

The best styles in woolen vestings are naturally to be found amongst those prepared for winter wear, and a favorite treatment is exemplified in Fig. "P." This is a double texture in both warp and weft, the face cloth being of one uniform color or shade, and relieved by spots of different colors scattered regularly over it. These are produced by the agency of the backing cloth, certain threads and picks of which are brought on to the face in these places. This system admits of almost endless modification

and many beautiful arrangements may, by the exercise of thought, be produced. In this particular one the order is as follows: The weave being arranged 1 face thread, 1 back, in both warp and weft.

Warp.	Shade.
11	Brown (Dark Shade).
1	Green (Medium Shade).
1	Brown (Dark Shade).
1	Green (Medium Shade).
1	Brown (Dark Shade).
1	White
1	Brown (Dark Shade)
1	White
1	Brown (Dark Shade).
1	Green (Medium Shade).
1	Brown (Dark Shade).
1	Green (Medium Shade).
21	Brown (Dark Shade).
1	White
1	Brown (Dark Shade).
1	White
1	Brown (Dark Shade).
1	Green (Medium Shade).
1	Brown (Dark Shade).
1	Green (Medium Shade).
1	Brown (Dark Shade).
1	White
1	Brown (Dark Shade).
1	White
10	Brown (Dark Shade).

The order of wefting is the same, but it will be necessary to start in a slightly different position (beginning 10 brown, 1 green, 1 brown, 1 green, etc.), in order to obtain the correct crossings on the spots. The design will make this point clear, however. This order really implies a solid brown for the face and for the back, and this being maintained in both warp and weft of the cloth causes a checked appearance on the back.

5 Brown.
2 Green.
2 White.
2 Green.
10 Brown.
2 White.
2 Green.
2 White.
5 Brown.

Where these colorings cross each other in weaving they are brought on to the face, the design shows in what manner, and by employing the four shaft hopsack weave, as at "Q" the spots are developed in three small horizontal bars of color, one series having white as the middle bar and the next one green, and so on alternately.

Counts of yarn: All 24 skeins wool with 76 threads and picks per inch.

These goods are invariably milled in finishing, afterwards being raised to obtain a fairly full and soft covering and satisfactory handle, no weave effect being left visible on either side. This idea of spotting vestings, entirely does away with loose ends and picks, since the spotting ends, when not engaged for that express purpose, are contributing to the firmness of the back cloth.

Returning again to Fig. "Q" the dots are representative of the face weave, two and two twill; the solid black squares indicate the backing weave which is the same; crosses show the depression of the backing threads under face picks; and black dots with white centres are the stitching places where backing threads are lifted over face picks to bind the two fabrics; solid white squares always indicating warp flush on the surface.

If desirable, the face and back twills might be started to run immediately one above the other and the stitches might also be arranged in a more broken up manner, but on acount of the weave being entirely obliterated in finishing, it matters little. A few moments study of the design will show how the cloths change positions where the spot occurs.

Other woolens are woven in moderately sombre shades and enhanced by skeleton checkings of not more than one or two threads in thickness and of a brilliant contrast. It is worthy of notice that a dull and heavy looking vesting fabric may often be made to appear quite smart when made up for wear, by the simple expedient of adding a few striking buttons. The fact is one hardly to be credited, but nevertheless it is so. When cheapness is a desideratum, we find the good woolen fabric on the back supplanted by one of "worked up" material and occasionally of cotton, a cotton centre warp being sometimes put in for the purposes of binding and giving weight.

In these compound fabrics, as in the single make textures, the worsteds assume superiorty in point of numbers over those of woolen manufacture, the better types of the former being the same quality of material throughout, recourse being had in the cheaper styles to the employment of cotton for

backing; but whether either the one material or the other is used, no alteration of the weaving plan is necessary. Figure "R" provides an illustration, the various kinds of marks being used for the sake of clearly pointing the building up of the plan; they stand in the same relation to each other as in the previous design. The face weave is ordinary four shaft hopsack, and the back is plain, with two picks in each shed. By having a double thread in the shuttle, these picks could be represented single in the design. The ties occur regularly, every backing thread coming in due course over a face pick.

The particulars for weaving this plan are as follows:

Warp. { 1 Thread, 2/36s Worsted—Navy Blue.
1 Thread, 2/36s Cotton—Navy Blue.
1 Thread, 2/36s Worsted—Navy Blue.
96 threads per inch.

Weft. { 1 Pick, 2/36s Worsted—Navy Blue.
2 Picks, 12s Cotton—Navy Blue.
1 Pick, 2/36s Worsted—Navy Blue.
120 picks per inch without spotting picks.

A small spot of a contrasting color should be introduced about every 24 face picks and threads. The number of picks employed should not be above four and the silk to be spun 2/60s and double. This will, of course, necessitate a much larger weaving plan, as enough repeats of the weave must be set down as will include one repeat of the spottings, which are managed in exactly the same way as previously indicated with the exception that instead of being brought over a face thread to stitch, they are carried over a backing one, thus keeping the front of the texture perfect.

Science and Practice of the Construction of Woven Textures.

FRED BRADBURY.

(Continued from August.)

The particulars of make for the three previous cloths, are respectively as follows:

NO. 1 CLOTH.

Dressed-faced union; weave, plain.
Warp: 2/36s cotton—diameter = (18 × 840)—8% = 1/111 of an inch.
Threads per inch in loom 30, or 18s, reed 2s.
Threads per inch finished, 38.
Width in reed, 71 inches.
Finished width of cloth, 56 inches.
Weft, all fine Botany wool.
9½ yards per dram (avoirdupois).
Diameter = (19½ × 16 × 16) — 16 per cent. = 1/41 of an inch.
Picks per inch in loom, 34.
Picks per inch, finished, 36.
Weight per yard of cloth finished, 16 ozs.
Result: satisfactory in every respect.

NO. 2 CLOTH.

Dressed-faced union, weave as No. 1.
Warp, 2/40s cotton — diameter = (20 × 840) — 8 per cent. = 1/120 of an inch.
Threads per inch in loom, 30, or 15s reed 2s.
Threads per inch, finished, 41 to 42.
Width in reed, 77 inches.
Finished width of cloth, 56 inches.
Weft, all fine Botany wool.
10 yards per dram (avoirdupois).
Diameter (10 × 16 × 16) — 16 per cent. = 1/43 of an inch.
Picks per inch in loom, 24.
Picks per inch, finished, 30 to 31.
Weight per yard of cloth, finished, 13½ ounces.
Result: much inferior to No. 1.

NO. 3 CLOTH.

Dressed-faced union—weave as Nos. 1 and 2.
Warp, 2/24s cotton (12 × 840) — 8 per cent. = 1/92 of an inch.
Threads per inch in loom, 27, or 13½s reed 2s.
Threads per inch, finished, 36.
Width in reed, 72 inches.
Width of cloth, finished, 56 inches.
Weft, all fine Botany wool.
9½ yards per dram (avoirdupois).
Diameter (19/2 × 16 × 16) — 16 per cent. = 1/41 of an inch.
Picks per inch in loom, = 35.
Picks per inch, finished, = 37.
Weight per yard of cloth, finished, 15½ ozs.
Result, much better than No. 2, but slightly inferior to No. 1.

It will be noticed that all the three textures are made from the same

quality of raw material; the fulling, dyeing and finishing operations being identical. The difference presented by the final results must therefore be due to some of the processes of manipulation of the raw product into yarn or of the manufacture into cloth or both.

With the view of ascertaining the cause or causes producing the aforesaid varied results, we will first consider the construction or manufacture

FIG. 29 and 29A.

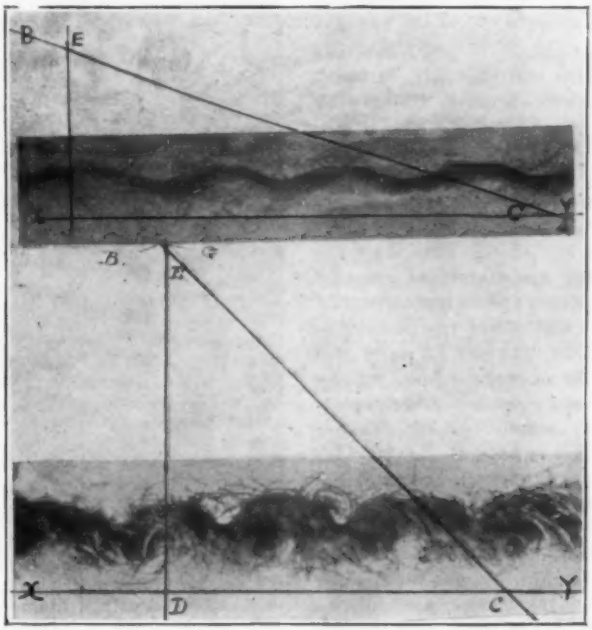


FIG. 30 and 30A.

of these woven textures. Out of a series of experiments the above three woven products are but selections, a detailed analysis of which reveals the following interesting facts.

In the construction of No. 1 cloth, we observe the diameters of the warp and weft to be respectively 1/111 and 1/41 inches. Further, since the picks per inch in the finished fabric are 36, and these are compressed so that the periphery of each thread of weft is in contact with the preceding and succeeding threads of weft, we may assume with justification, that the diameter of the weft has been changed from 1/41 to 1/36 of an inch in the direction of the warp, while a corresponding decrease has necessarily taken place in the weft at right angles to the warp. (See Figs. 16 and 17, also definition of same in May issue '98.)

The decreased diameter may readily be obtained by the application of formula VI., page 65, May, '98. Original diameter squared ÷ increased diameter = decreased diameter = $(1/41 \times 1/41) \div 1/36 = 1/46.7$ or 1/47 of an inch which means that the thickness of the weft at the point of intersection with the warp threads = 1/47 of an inch. The difficulty of selection from previous diagrammatic illustrations or of constructing a new one which shall satisfy, in every respect, the proper construction of these fabrics, is best expressed in Sir Walter Scott's description of looking for a straight path through a common over which there are a hundred devious

ways (tracks), but not one straight line of road. Thus, for example, the various angles demonstrated at Figs. 8, 9, 10, 11 or 11a, have each points of similarity betwixt the angles produced by the warp and weft threads of No. 1 cloth, though none can be said to fully satisfy the construction of this or either of the other two textures.

Photo-micrographs, representing 15 to 16 times the original diameter of the warp and weft threads of the former cloth, are shown at Figs. 29 and 30 respectively. From these illustrations it will be observed that both sets of threads are bent out of the straight line. The warp though only slightly, is greater, (as will presently be seen), than the warp of either No. 2 or 3 cloth. The bending of the weft is considerably greater than the warp, and may, as we have considered, bend sufficiently to admit of the weft threads lying as close to each other as their peripheries will allow. Then since the warp threads are slightly bent out of the straight line, the distance apart of the threads and of the fraction represented by one diameter of warp plus one diameter of weft is less, producing a greater denominator; consequently the number of threads per inch, which it is natural for the cloth to contain, is slightly in excess of the number obtained when the threads retain a curveless condition. Accepting the above difference to be comparatively insignificant, we prefer for present and instructive purposes to first determine the number of threads per inch by finding the distance occupied by one diameter of warp plus one diameter of weft. Subsequently we will establish and substantiate a simple method of determining the natural number of threads of warp and weft per inch, for any natural angle, when both sets of threads are bent out of the straight line. Meanwhile we notice, in No. 1 cloth, the diameter of the warp = 1/111 inches, the diameter of the weft at the point of intersection with the weft = 1/47 inch. Then the distance occupied by each thread of warp = $[(2 \times 1/111) + (2 \times 1/47)] \div 2 = [(2 \times 47) + (2 \times 111)] \div (111 \times 47 \times 2) = 1/33$ inch, or 33 threads per inch (see Formula III., page 68, Feb. '98.) Note that the actual ideal fabric contains 38 threads per inch, partly due to reasons explained above, in addition to others which will be enumerated and explained presently.

Calculating cloths Nos. 2 and 3 upon the same basis, we observe in No. 2 cloth, that the diameter of the warp equals 1/120 of an inch, the original diameter of the weft equals 1/43 of an inch, the picks of weft per inch are 30 to 31. Therefore, the diameter of the weft in the direction of the warp length equals 1/30.5 of an inch, hence the diameter of the weft at right angles to the warp or at the points of intersection with the warp is determined by the application of Formula VI., May issue, 1898, as follows: Original diameter squared ÷ increased diameter = decreased diameter = $(1/43 \times 1/43) \div 1/30.5 = 30 \div (43 \times 43) = 1/60$ of an inch nearly.

Therefore the number of warp threads per inch equals $[(2 \times 1/120) + (2 \times 1/60)] \div 2 = [(2 \times 120) + (2 \times 60)] \div (120 \times 60 \times 2) = 1/40$ of an inch, or 40 threads per inch. Note the actual cloth contains 41 to 42 threads per inch.

In No. 3 cloth it will be observed that the diameter of warp equals 1/92 of an inch, that of the weft equals 1/41 inches. The picks of weft per inch equal 37. Consequently, the diameter of the weft in the direction of the warp is represented as 1/37 of an inch. Therefore the diameter of the weft at the point of intersection with the warp equals (Formula III.) $(1/41 \times 1/41) \div 1/37 = 1/46$ of an inch, nearly.

Hence the number of warp threads per inch equals $[(2 \times 1/92) + (2 \times 1/46)] \div 2 = [(2 \times 46) + (2 \times 92)] \div (46 \times 92 \times 2) = 1/30$ of an inch or 30 threads per inch. Note the actual cloth contains 36 threads per inch.

In the construction of all the three textures it will be noticed: First, that the number of picks per inch in the finished fabric No. 1, are five less, or 12 per cent. less, than the actual diameter of the weft naturally admits; in No. 2, there are 12 to 13, or 29 per cent. less, of picks of weft than there are diameters of weft per inch, while in No. 3 cloth, the actual number of

picks of weft less than is represented by its diameter, is 4, or 10 per cent. Second: The number of warp threads in No. 1 texture are five more, or an increase of 15 per cent., upon the calculated results. No. 2 reveals an excess of only one to two threads, or four per cent., whereas No. 3 cloth shows an increase of six threads per inch, or 20 per cent., upon the calculated results.

From the foregoing it is evident that in No. 1 and 2 cloths, the setting together with the amount of cover previously mentioned are similar. Further, if No. 2 cloth be compared with either 1 or 3 in these same particulars, it is found to be dissimilar.

FIG. 31. Warp for Cloth 2.

FIG. 33. Warp for Cloth 3.

If the different results obtained and made known in the above three woven fabrics is influenced in any way by their construction, it would appear that the number of weft threads which the finished fabric should contain ought to be about 10 per cent. less per inch than the actual number of diameters of weft yarn for the same unit, and that the number of warp threads per inch in the finished fabric should exceed the calculation results, determined on the above basis, by about 15 per cent.

Further, the foregoing results indicate that the piece should be allowed to freely shrink in width, while the length of the fabric should be kept under control. The shrinkage in width should be from 20 to 22 per cent., while the pick wheel upon the loom should represent about 3 to 4 per cent. of picks less than are required in the finished fabric. After the woven piece has been out of the loom it will probably be found to contain even more than is required in the finished texture, which means, as is almost invariable in practice, that the actual gray length of these textures is somewhat less than that of the finished fabric.

Then given a yarn of the best quality and which has been suitably manipulated in each of the preparatory processes, I hesitate not in asserting that if made upon the lines indicated as above the final result will be satisfactory.

A point worthy of note at this juncture, is the shrinkage of No. 2 cloth, which, though considerably in excess of either Nos. 1 or 3, only produced an increase of four per cent. of threads in the finished fabric as compared with the calculation results. Singularly enough, no amount of milling would bring the cloth up to the same relative condition as either No. 1 or 3, for the more the piece shrunk in width, the greater became its length, consequently, fewer threads of weft per inch was the result. We have already observed that this fabric contains too few threads of weft, 15 to 20 per cent., hence any reduction in the number of weft threads is manifestly wrong.

Further, a greater length of finished cloth for the same length of warp involves, that the angle produced by the threads of the latter becomes less, e.g. compare the photo-micrographs of Figs. 29, 31 and 33 which are warp threads that have been taken out of cloths Nos. 1, 2 and 3 respectively, though taken with different objectives which does not affect the point at issue. The angles of curvature of Figs. 29 and 33 are definite as compared with the almost perfect straightness of Fig. 31, and too apparent to need any demonstration at this juncture. Ultimately it will be shown that a perfectly, or an almost perfectly straight line of warp is a factor which does not assist in the production of an ideal cover of face of texture. From the above then, it is evident that one defect in No. 2 fabric is, that it was woven with too few a number of warp and weft threads per inch in the loom, which could not be rectified in the fulling and finishing.

(To be continued.)

KNITTING DEPARTMENT.

The Knit Goods Situation.

The war cloud has blown over, just as the spring underwear lines have been fairly opened and the fall trade in imported hosiery begun. A silver lining to the cloud is confidently expected by everyone, although few are sanguine enough to predict substantially higher prices. Here and there is a specially desirable line that may have commanded 5 per cent. premium, but these cases are too sporadic to prove even any tendency to advance, to say nothing of an advance itself. The depression in cotton is a factor not easily overridden in the situation. In fact, if prices are kept firm for a few weeks, the majority of the trade will be well content, for the increasing demand sure to follow the declaration of peace will care for the near future. The developments of the last few weeks strongly move toward proving the prediction made in this column for two successive months—that the rage for fancies has reached its highest mark, and is now slowly but steadily decreasing. This fact, rightly interpreted, will merely result in buyers selecting their fancies with more and more care. The craze for bright things, particularly in women's wear, is altogether too strong to be eradicated, for several seasons; in fact, the close of the war promises to make colors more popular than ever this winter. The falling off in the call for fancies simply means that the public has tired of buying nightmares of bad designer's brains and botches of execution from careless mills. The only claim to attention these ever had was that they belonged to the fancy family. The coming flop means that the firm whose fancy lines are put in with extra discrimination and shrewdness will make more money with them than ever before, because it will get the trade, not only of those concerns whose fancies are poorly selected, but also of those, who, in the fright, fought shy of fancies along the whole line.

Late July and early August did not show many re-orders or much new business for fall knit goods, but there was more punching up for delivery than has been felt for a long time. Not a few wanted their goods some days ahead of their ordered date. The manifestations in this direction could scarcely be more healthful. The government demand, while it will steadily lessen from this out, will show no great falling off for fully six months, and must permanetly remain from double to treble the average of years past. Stocks are splendidly cleared up. Inquiries have been numerous in all lines for several weeks, showing that no indifference existed. Any little advance, with this temper, would stimulate buying. Fleeced underwear of the better mills is already oversold. Some improved demand for better grades of cotton underwear is reported, but it is not general enough to possess any real significance. The basket weave effect and drop stitch is shown more extensively in spring underwear than ever before. They promise to replace gauze goods, being cooler than the lightest balbriggans. Swiss ribbed underwear is doing well. Dropped-stitch hosiery, too, is more and more offered, as is a combination of ribbed hose with embroidery. The late spring and summer are being followed by a late fall, and movements are from one to three weeks behind the season.

Importers are not busy; they seldom are at this period. Lace striped and open work hosiery, also embroidered goods, particularly in lisle-thread and all-silk, are in request. The same un-

dertone of confidence that has been marked for several months among knit goods men continues in increasing volume. Just now it has reached a height that imparts a feeling of positive buoyancy.

Fashioning on the Circular Rib Knitting Machine.

It is well known that the term fashioning as applied to ordinary hosiery is the shaping of a piece of fabric by the gradual reducing of its width. This on a flat fabric is done by the transferring of the outer loops from their needles on to others more inwards, leaving the outer needles empty, and other needles having two stitches, the number of such double loops being equal to the number of needles empty. Such needles when empty do not knit again until such time as a wider fabric is required. In circular machines it is difficult to reduce the quantity of needles in the given circle, though this has been done, but as the circumference of such circle still remains the same, such reduction becomes noticeable on a plain fabric. In rib fabrics this is minimized by the fact of the rib needles each drawing their own loops independent of the cylinder needles, and a fabric may be reduced in width by an actual reduction of the number of needles on one or more principles; it is of these that this article will treat.

To illustrate these different methods it is necessary to have some foundation to work upon. For this purpose take a 72 needle circular knitting machine of the Griswold type. This consists of a fixed frame cylinder, having 72 tricks cut round its outer circumference in each of which a needle can work up and down, such movements of course being in accordance with the ordinary rules of knitting. Lying horizontal above this cylinder is the dial or rib machine, in this tricks are cut radiating from the centre, and in these work the dial or machine needles.

By the position of cylinder and dial the two sets of needles work at right angles to each other, the one working between the other in several different positions. Before proceeding further the relation of these two sets of needles must be distinctly understood. For this purpose fig. 1, represents a plan of a small section of a frame cylinder is shown. B is the circumference of the needle cylinder, and D and E the tricks extending outward to the line C, the distance between each trick as D1 and D2 being the needle space.

Let us suppose that 72 such needles

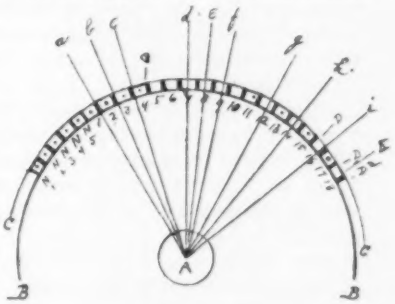


Fig I

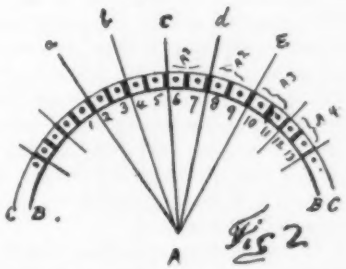


Fig 2

are around the circumference, capable each of holding one needle, if such needles were placed in each trick as shown at N1, N2, N3, N4 and N5. Then 72 needles would stand perpendicular as frame needles. Let it be understood that this is not absolutely necessary in order that such needles may knit, but that many variations can be made according to the class of work to be produced. Two points, however, must be distinctly understood: First, that according to the distance between one needle and the

other next adjoining, so is the length of thread at this point, and so the appearance of the work affected. Second, that from such thread other or rib loops can be made if such needles work in position to take the thread under proper knitting conditions.

On again referring to fig. 1, will be seen how a few of these changes may be made. For making plain work each cylinder needle space has a needle as represented by dots at N1 to N5, and for 1/1 rib work each cylinder needles is placed in alternate spaces, and a dial or rib needles as represented by the lines "g. h. i." works over the alternate empty spaces, each needle lying in its groove or represented by the lines "g. h. i." Needle "g," lying over the space 12. Needle "h," over space 14, and needle "i" over space 16; while spaces 11, 13, 15, 17, each have a cylinder needle so that at this point, 11 to 17, there are alternate one frame and one machine needle. Thus in a circumference of 72 there would be 36 frame and 36 dial needles, at equal distances from each other.

But to make other ribs as 2/1, 3/2, 6/3, and similar ribs, according to the number of needles used so different principles have to be observed, viz.: the placing of a number of frame needles together, as at N1 to N5, and also a number of dial needles together, as at "d, e, f," where over spaces 7, 8, and 9, work 3 rib needles together side by side.

It may be here mentioned that dials have to be cut according to the class of rib or ribs to be made; but of the principle of dial cutting more will have to be said when we come to the reducing of needles for fashioning, etc.

It will now be seen that the 72 needles used may be divided into various proportions, as for 1/1 rib 36 each; for 3 and 1 rib 54 frame, and 18 rib. The dial containing the rib needles is adjustable, and has a sideway movement, in order that the rib needles shall work exactly over the spaces in the frame cylinder when working on the principle explained, and as shown at "d, e, f, g, h, i."

For another principle to be dealt with the machine dial is adjusted so that the rib needles, instead of standing over each space, now stands over the posts, as shown at "a, b, c," fig. 1. Here each frame cylinder space, as 1, 2, 3 and 4, is full of needles, and the rib needles stand over the division posts of these spaces. In this principle it will be seen that 72 frame needles could be used, and with a needle over each post 72 machine needles; but as 2/1 rib is a more general rib made on this principle, then 72 frame and 36 rib needles are used; for 3/1, 72 frame and 24 rib or dial needles, and so on to 72 frame and 12 rib needles in 6/1 rib work.

From the foregoing, it should now be understood the position that rib and frame needles can take in relation to each. It is this, together with the adjusting in different positions of the machine dial, that enables a reduction of the numbers of loops around a given circumference, as is required during narrowing or fashioning of a circular rib fabric as in the legs of ladies' hose, men's hose, and cycling and other sporting hose. Such reductions being made, each loop that is reduced must have some connection with the fabric before a perfect fabric can be made, so that as a frame or machine needle is taken out, the last loop it or they made must be put upon the adjoining needle.

Some of the methods used for reducing the quantity of needles are by reducing the rib, as for instance, if a 2/1 fabric is made with 72 and 36 needles respectively, then 108 needles are in work; this reduced to 1/1 would be 72 needles only at work, though the same circumference of needle cylinder is used; but as each loop requires a given amount of thread, naturally the thread used at each revolution is much less by reason of the less loops, and so the fabric is reduced accordingly.

Another principle keeps the ribs the same, the reduction being in reducing

the number of ribs, and not the needle loops in an individual rib.

In order that the various methods of fashioning shall be distinctly understood, it is first necessary that the relation of the two sets of needles shall be clear. For this purpose a table of the various positions are here given, showing the different fabrics produced on a 72 needle machine by the arrangement of needles and dial on the principles explained. Such a machine, it will be found, can be set out in twelve different ways, as follows:—

Position 1, 72 cylinder and 72 dial needles = 144 needles for producing a fine 1/1 rib fabric.

Position 2, 72 cylinder and 36 dial needles = 108 needles for producing a fine 2/1 rib fabric.

Position 3, 72 cylinder and 24 dial needles = 96 needles for producing a fine 3/1 rib fabric.

Position 4, 72 cylinder and 18 dial needles = 90 needles for producing a fine 4/1 rib fabric.

Position 5, 36 cylinder and 36 dial needles = 72 needles for producing a coarse 1/1 rib fabric.

Position 6, 48 cylinder and 24 dial needles = 72 needles for producing a coarse 2/1 rib fabric.

Position 7, 54 cylinder and 18 dial needles = 72 needles for producing a coarse 3/1 rib fabric.

Position 8, 48 cylinder and 12 dial needles = 60 needles for producing a special 4/1 rib fabric.

Position 9, 36 cylinder and 18 dial needles = 54 needles for producing a special 2/1 rib fabric.

Position 10, 24 cylinder and 24 dial needles = 48 needles for producing a special coarse 1/1 rib fabric.

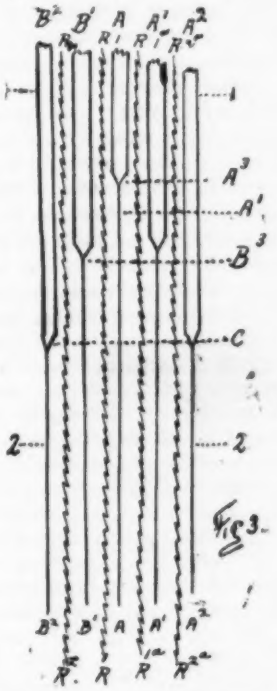
Position 11, 48 cylinder and 48 dial needles = 96 needles for producing a 2/2 rib fabric.

Position 12, 60 cylinder and 24 dial needles = 84 needles for producing a 5/2 rib fabric.

It must be understood that in special cases the dial may require to be changed, substituting a different dial, cut so as to bring the dial needles over its respective post or space as required.

It will be seen from the table given above that in the first four positions the cylinder is always full of needles, and the ribs are made by the position of the rib needle being over the post, as shown at "a, b" and "c," fig. 1, and at the respective distances apart, that is, between every cylinder needle in position 1, between every second, every third, and every fourth needle in positions 2, 3 and 4.

In positions 5, 6 and 7, the rib



needles are over the spaces, as at "g, h, i, fig. 1, position 5 being alternately 1 cylinder and 1 rib needle. In position 6 are 2 cylinder needles, with third empty, over which works the rib needles, these being arranged, 2 spaces and 1 needle.

Position 7 has 3 cylinder needles together and one empty space, and dial 3 spaces and 1 needle.

Positions 8, 9, 10 involve another principle. Here at position 8 the cylinder needles are placed 4 needles and 2 empty spaces, the rib needles

being 5 spaces empty and 1 needle; this rib needle working over the post between the two empty cylinder tricks.

At position 9 in cylinder are 2 needles and 2 empty spaces, with rib needle over centre post of the two empty spaces; and at position 10 the cylinder has 1 needle and 2 empty spaces with 1 rib needle over the centre post, as before. This is a very coarse rib. Position 11 has 2 needles in cylinder with one empty space and 2 rib needles placed in every second and third groove, working over posts. Position 12 is 5/2 rib, having 5 cylinder needles and one empty space, and rib needles in every fifth and sixth groove, so standing over posts between each 5 needles.

In order to show the several principal systems of fashioning, a few different machines will have to be taken as examples, and to do this it will be best to treat on the different articles themselves rather than on the system, taking first, how to fashion women's 2/1 rib hose.

Example 1.—Woman's 2/1 rib hose, leg on 48/2 and 1 ribs, on a machine with a cylinder having 96 needle spaces and with dial cut for 48 needles, each needle groove standing over every alternate post of cylinder, as shown at Fig. 2, 1 to 9 showing cylinder needles, position being 96 round the circumference. "A, b, c, d, e," show the positions of rib needles continued round, being 48 in number.

As we are dealing only with the question of narrowing, it will be sufficient to know that the upper part of the stocking is 48/2 and 1, or 96 cylinder 48 dial; total 144 needles. In such a stocking the 144 needles are reduced to 121 needles, a portion of the 2/1 ribs being reduced to 1/1 ribs by the following method, as shown at Fig. 3, where "A" represents the centre rib of that part of the machine on which the heel is made. At 1 all are 2/1 ribs, the pairs of cylinder needles being shown at "A, A^1, A^2, B^1, and B^2," and the rib needles by wavy lines "R." At "A," the first narrowing is made by transferring the needle loop composing the rib "A," to the adjoining needle of the rib as shown at "A^1." Now the empty needle is removed, and only one needle knits instead of two between the rib needles "R" and "R^1a."

At "B^2," the second narrowing takes place, and at this and each subsequent narrowing each rib to the right and each to the left of the last narrowed rib on each side is transferred in the same way.

Now ribs "A1" and "B1," which at 1, were 2/1 ribs are now 1/1 ribs. At "C" the same process again takes place as shown. This is continued as required, say for 12 times, with the effect that, at the first narrowing "A," the number of needles working is reduced from 144 to 143 and at the 2nd and 3rd and all other narrowing, 2 needles being taken out, each narrowing reduces the number by 2, so that at the second narrowing the number is reduced to 141, at the 3rd to 139, until at the 12th only 121 needles remain at work. These are as follows: 1 narrowing of one needle and 11 narrowings of 2 needles taking out 23 needles leaves 25 ribs 2/1 and 23 ribs 1/1 or 50 cylinder and 25 dial for the 2/1 ribs and 23 cylinder and 23 dial needles for the 1/1 rib or use in all 73 cylinder and 48 dial needles, total 121 needles.—The Knitter's Circular.

(To be continued.)

Cotton Hosiery.

A CUSTOMS DECISION.

A decision has been handed down by the Board on Classification of the United States General Appraisers on the protests of J. V. Farwell Co., and Marshall Field & Co., against the collector at Chicago on importations of "full-fashioned" cotton stockings, hose or half-hose, knitted with stripes in different colors, running transversely or crosswise, and which, after leaving the knitting machine, have been chain-stitched longitudinally with single strands of silk or cotton threads at such intervals and in such manner as to produce embroidery effects and give the articles the general appearance of

Scotch plaid. The protests were against the assessment of duty at 60 per cent. ad valorem under paragraph 339, Act of July 24, 1897. It was claimed by the importers that the merchandise was dutiable according to value per dozen, under the provisions of paragraph 318 of the present tariff. The Board found that the merchandise in question contained cotton stockings, hose or half-hose, ornamented with single strands of silk or cotton threads by means of a sewing machine, and known as chain stitching. The Board further found that the merchandise was not embroidered by hand or machinery and is not known commercially as embroidered hosiery. The protests were sustained.

Circular Knitting Machines.

It is customary in circular-knitting machines in forming the heel and toe pouches or bulges of stockings, after knitting the leg and arriving at the proper point for beginning the knitting of the heel or toe bulge or pocket, to raise into inoperative position a certain number of needles on one side of the machine. The number thus raised is generally about one-half of the entire series of needles employed in the machine, the raised needles retaining their loops thereon. The needle-actuating cam-carrying cylinder is then reciprocated, and at each limit of rotary reciprocation thereof the end needle in operation is raised, it retaining its loop, and thus gradually narrowing the web being knit, and thereby partly forming the heel or toe pouch, pocket, or bulge. After thus narrowing to the desired extent and producing the desired taper to the knitted fabric, the needles last raised out of action are consecutively restored to operative position through the action of the reciprocating cam-cylinder, and thus is formed the second portion of the web, this portion becoming gradually widened and joined at its edges to the edges of the narrowed portion first formed. When these two edges and portions are so united, they form the pocket or bulge which forms the heel. On the completion of this heel-forming pocket all the needles which were left in action before the commencement of the forming of the heel-pouch have been restored to operative position, and the other half of the needles, which were thrown out of action before the commencement of the knitting of the heel, are restored to operative position. The cam-cylinder then ceases, through hand-controlled means to be reciprocated, but rotates, and the circular knitting is then proceeded with until it is desirable to form the toe, when one-half of the needles are again raised out of operative position and the cam-cylinder again reciprocates in a manner and with a result similar to that already described in the formation of the heel pouch or bulge. Mechanism for accomplishing the above results is old in various specific forms.

There has recently been contrived certain devices that consist in providing an automatic lock for stopping the mechanism when the circular knitting has reached the stage requiring the raising of one-half of the needles out of operative position previous to the formation of the heel-pouch, and to stop the machine again on the completion of the heel pouch or bulge, again arresting the machine on the completion of the circular knitting forming the foot, and yet again on the completion of the toe-pouch. The size of the leg, heel, foot, and toe portions of the stocking is thus pre-determined.

These new devices consist also in in having an endless sprocket-chain divided into a series of sections. These sections are pre-determined by a projecting pin integral with or firmly fixed to the proper positioned links of the chain. The distance of the pins apart pre-determines the length of the leg and foot of the stocking, and also the size of the heel and toe. On commencing the knitting of a stocking after the formation of the leg, the projecting pins are gradually carried forward on the supporting-chain until one strikes a spring-actuated lever. This lever is in effect a lock for the belt-shifter, and the effect of this pin engaging this lock is to unlock the

belt-shifter, and thereby shift the belt to the loose pulley. A weighted arm normally holds the belt-shifter arm in tension, and immediately on its being raised, the shifter-arm is forced over, shifting the belt on the loose pulley, thus stopping the machine.

A third feature of this mechanism consists in a simplified contrivance for reciprocating the cam-cylinder. This consists of a crank belt wheel, a lever connected thereto at one end and to a segmental rack at the other. This segmental rack actuates a pinion, and the pinion is fixed to the shaft which carries the bevel-gear, whereby the cam-cylinder is reciprocated.

Machine for Uniting Knit Fabrics.

The inventions relating to knitting machinery are numerous, and many of them meritorious. While we present, herewith, an illustration and description of a new machine for uniting knit fabrics, we have no record showing that it has demonstrated for itself practical features of value to the knitter. This machine relates particularly to chain loopers, and the device to which we desire to call attention, is for forming an open or spread loop whereby the seam formed between connected fibres is elastic in the direction of the elasticity of the connected fibres to prevent drawing at the seam and to relieve the latter of unnecessary strain in use.

Our illustrations show a plan view of a looping machine, with the new device attached, and a detailed perspective view of the needle looper, gauge plate, and the co-operating parts showing the needle bar at the end of its back stroke. We also illustrate the impaling and looping pins. One of the objects of the invention is to provide movable looping-pins which are projected into the path of the thread-needle at the point of operation and are automatically folded after they have performed their function to withdraw them from the work.

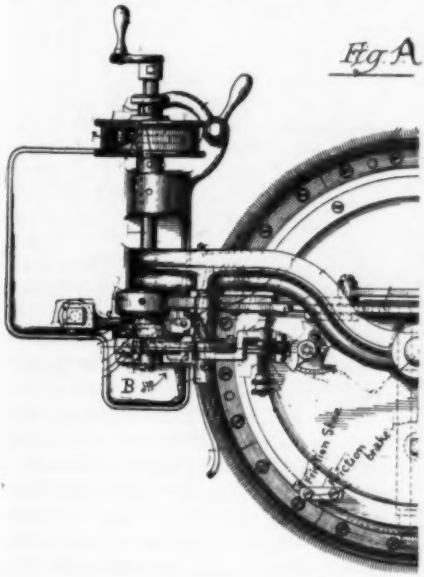
A further object of the invention is to provide shifting or shunting devices for throwing the looping-pins out of operative position and into view, whereby the condition thereof may be inspected and whereby they may be readily removed separately for purposes of repair. In operation the articles of fabric to be united are arranged upon the impaling-pins in the ordinary way well known in the art, to cause each impaling-pin to engage the corresponding edge loops of the articles. Then with the parts in the positions shown in Fig. B, the rotation of the driving-shaft causes the thread-needle to advance and traverse the upper grooved or channeled surfaces of the impaling-pins, and hence pass through the alined edge loops carried by the impaling-pins. The thread-loops carried forward by the thread-needle are then engaged by the looper in the ordinary way. As the thread-needle withdraws to the first position illustrated in Fig. B, this thread-loop is held by the looper. The thread-needle then advances in the plane of the next impaling-pin, the table having been advanced one step by means of the feeding mechanism provided for that purpose; but as a looping-pin is arranged between each two contiguous impaling-pins it will be seen that this succeeding forward movement of the thread-needle causes it to carry the thread around the looping-pin. As the thread-needle advances the lateral depression of the cam registers with the shoe on the looper-arm, and hence allows a slight lateral swinging movement of the looper-arm in the direction indicated by the arrow, to carry the thread-loop previously engaged thereby beyond the path of the thread-needle, whereby the thread-needle passes there through. The enlargement of the cam now causes the swinging movement of looper-arm in the opposite direction to that indicated by said arrow, whereby the previously engaged thread-loop is left upon the thread-needle, the looper being withdrawn from engagement therewith. The looper immediately after its withdrawal and disengagement of the previous loop, is again

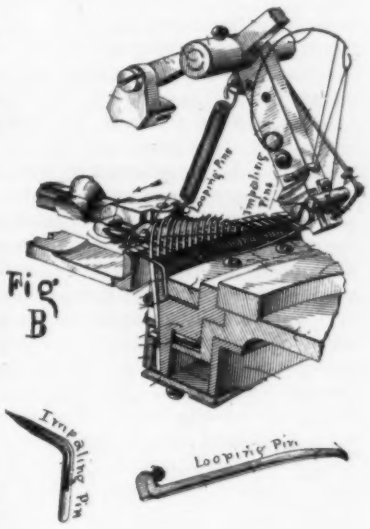
advanced in the direction indicated by the arrow to engage the thread-loop just brought forward by the thread-needle. Hence it will be seen that while the loop or stitch which is formed by the co-operation of the thread-needle and looper is substantially identical with that heretofore produced by machines of this class, the fact that the looping-pins are interposed between the impaling-pins causes each loop or stitch to be formed around a looping-pin. As the work proceeds the stationary cam-guide with which the looping-pins co-operate withdraws the looping-pins from the loops or stitches of the work, and thus leaves loose stitches, whereas heretofore the stitches have been drawn more or less tightly, according to the adjustment of the tension devices. In other words, the looping-pins serve as positive means for causing an enlarged or elastic loop for each stitch of the machine, the looping-pins being arranged in such positions that each stitch of the machine is formed therearound. The result of this operation is that the seam formed between united fabrics is approximately, if not fully, as elastic as the fabrics thus united, whereby in use the joints between the connected portions of an article are not strained. The seams are yielding to correspond with the yielding quality of the fabrics.

In connection with the mechanism a friction break, as noted in one of the illustrations, consisting of a plate secured at one end to the stationary portion of the table, and having a friction shoe, adjustable by means of a screw bearing upon a rotary disk.

—The chief defects which arise in leather-covered rollers are: 1st, hollow places or channels; 2d, fluting; 3d, piecings giving away. These are three of the chief defects put in the order of their importance.

—The sheep and goat returns of South Africa, lately published, give the number as follows: Merinoes, 9,564,360; Cape sheep, 1,412,611; Angoras 3,233,119; Boer goats, 1,646,516. The production of wool, was 92,962,896 lb., and of mohair, 10,087,615 lb. There is evidently some discrepancy in these figures, as the return of wool is far in excess of the weight of fleece averaged by the sheep in South Africa.





POWER DEPARTMENT

ELECTRICITY—STEAM—WATER.

Mechanical Draft for Steam Boilers.

WALTER B. SNOW.

Engineering Staff of the B. F. Sturtevnnt Co

Abstract of a lecture delivered before Sibley College, Cornell University, April 22, 1898.

The first requisites for the successful combustion of fuel are the supply and proper distribution of a sufficient amount of air. To insure the fulfillment of these requirements in steam boiler practice, draft is necessary, and the force of the draft must be expended in two ways. First, a portion is necessary to overcome the resistances of the grate and the fuel upon it, of the combustion chamber, flues or tubes and uptake, and of the means of connection to the source of draft, be it fan or chimney. The sum of these resistances is a measure of the pressure head. Second, the draft must, in addition, be sufficient to impart to the air the necessary velocity to furnish the amount requisite for the direct purposes of combustion. This is a measure of the velocity head. With a constant total head any change in the resistances immediately alters the relation between the pressure and velocity heads. Professor Gale found, in the case of a stationary boiler furnace of ordinary construction, that only about 4 per cent. of the total draft pressure was actually expended for the production of velocity, and the movement of the air. Therefore, designs for draft-producing apparatus must first contemplate the creation of sufficient intensity of draft to overcome all resistances, and then provide capacity for the necessary amount of air.

In the case of a chimney, the maximum draft being dependent upon its height, is constant for the same temperature, and regulation of the combustion can only be secured by throttling the air supply. With a fan, however, the intensity of the draft may be instantly changed from zero to the maximum with a proportional increase in the air volume. Properly, the draft to be determined in practice is that relating solely to the supply of air to, and the overcoming of resistances in, the fire.

The chimney has long stood as practically the only available means of producing draft which, thus produced, has commonly been called "natural draft." Primarily introduced for the purpose of increasing the rate of combustion, artificial draft was designated as "forced draft." The fan has become the accepted symbol of artificial, or mechanical draft, and is today the accepted substitute for the chimney.

Two types of fans exist. The first, known as the disc or propeller wheel, is constructed on the order of the screw propeller and moves the air in lines parallel to its axis. It is practically valueless for draft production. The second, or fan blower proper, consists in its simplest form of a number of blades extending radially from the axis, and presenting practically flat surfaces to the air as they revolve. By the action of the wheel the air is drawn in axially at the centre and delivered from the tips of the blades in a tangential direction. This type may be simply designated as the centrifugal, or peripheral discharge fan.

In the design of a fan wheel to meet given requirements it is necessary to make its peripheral speed such as to create the desired pressure, and then to so proportion its width as to provide for the required air volume. If possible a fan should never be made so small that it is necessary to run it above the required pressure in order to deliver the necessary volume. To double the volume under such circumstances requires eight times the power;

three times the volume demands twenty-seven times the power.

The chimney as a means of creating a movement of air depends upon the heating of that air, by which a difference in density is produced. The heat thus employed is, however, absolutely wasted, so far as its utilization for any other purpose is concerned. This inherent loss with an ordinary coal actually amounts to about 20 per cent. when the gases are at 500 degrees, and the excess of air is 100 per cent.

Heat being the agency by which the air movement is brought about, the efficiency of a chimney must be measured by the amount of heat expended for this purpose. As heat is transformable into work, the efficiency is therefore, to be measured by the number of foot-pounds of work represented by the pressure difference exerted through the distance moved, as compared with the number of foot-pounds represented by the total amount of heat expended.

It may be shown that when no work is lost in friction and the respective temperatures of the external air and the chimney gases are 62 degrees and 500 degrees, the theoretical efficiency of a chimney 100 feet high will be only about six ten-thousandths.

If in the place of the chimney there be substituted an engine-driven fan of proper size, the resultant of the efficiencies of the steam boiler, the engine and the fan, together with the loss by friction in the apparatus, may be reasonably taken at about 4 per cent. Therefore, the work done, or its equivalent in heat units expended to produce the given result will be about 70 times as great in the case of a chimney as in that of a fan. All other questions aside, the fan is, therefore, far more economical than the chimney. This economy means that when a fan is employed, the surplus heat can be utilized and the gases reduced to a minimum temperature before they escape.

The methods of application of mechanical draft may be broadly classified under two heads,—the plenum and vacuum methods. Under the plenum or "forced" draft method the air may be supplied in either of two ways. First, by making the ash-pit practically air tight, and forcing the air into it. Second, by making the fire room itself practically air tight and maintaining therein the required air pressure.

Under the vacuum or "induced" method there is practically only one means of application,—that by the introduction of an exhausting fan in the place of a chimney. A short and comparatively light stack usually serves to carry these gases sufficiently high to permit of their harmless escape to the atmosphere.

The application of mechanical draft presents a three-fold opportunity for increased economy in steam production: first, in the reduction of avoidable losses, second, in a decrease in the first cost and resultant fixed charges on the entire generating plant, and third, in a reduction of the operating expenses, chief among which is the cost of the fuel. In addition, mechanical draft possesses certain advantages which cannot be directly measured in dollars and cents; such are its peculiar adaptability to the requirequirements, its independence of climatic conditions, its flexibility and the like.

The presence of smoke indicates an absolute loss. Although this seldom exceeds one per cent. in ordinary practice, even this amount may be almost entirely eliminated and the smoke nuisance may, in most cases, be practically avoided by such regulation of the air supply and the intensity of draft as is possible under the conditions of mechanical draft.

The loss of efficiency which ensues from the escape of carbonic oxide unconverted into carbonic acid is due to the much smaller amount of heat given out upon the incomplete combustion of carbon into the former gas. When a fire is suddenly thickened and deadened by additional coal, and large volumes of gas are given off, there is a demand for an increased air supply

for the purposes of combustion. At the same time there is a tendency to clog the passages through which the air has previously passed, and thereby to prevent complete combustion at the surface of the fire. At this time, for perfect conditions, more air under greater pressure should be admitted, as is possible under the positive action of mechanical draft.

A most important advantage of mechanical draft is presented in the opportunity which it affords for the proper regulation of the air supply. A certain amount of air is usually necessary for the purposes of dilution, but an unnecessary excess is productive of one of the greatest losses incident to steam generation. Theoretically, the amount of air chemically required for the combustion of one pound of coal is about 12 pounds. Donkin and Kennedy have shown by gas analyses that, in the case of 16 different plants, the air supply ranged between 56 per cent. and 328 per cent. in excess of the chemical requirements. If the air be supplied in excess of that necessary for perfect combustion, there is a definite loss, disregarding that due to moisture in the air.

In addition to the economic advantages of mechanical draft which have been presented, there are others which relate primarily to the convenience of installation and operation. Prominent among these is the feature of adaptability. The fan, which is usually of steel plate, may be constructed in any shape to meet specific requirements, may be located as desired with regard to the position of the boilers and without expensive foundations, may be used for either forced or induced draft, and because of its portability may be relocated or exchanged for another of different capacity. In its operation the fan is perfectly flexible, may be run at high or low speed, independently of the chimney temperature, and is always susceptible of instantaneous change in response to sudden demands. A mere change in engine cut-off produces an effect only secured with a chimney by adding to its height at great expense.

Mechanical draft now stands so well established in the engineering world as to lead a noted engineer to remark that, "the building of tall chimneys to secure draft simply advertises the owner's lack of familiarity with modern improvements, or his want of confidence in results easily demonstrated."

Practical Electricity.

TROUBLES.

(Continued from August.)

Noise in a dynamo or motor, aside from the annoyance it causes, is an almost certain indication of trouble.

It might be well to say however, before we proceed to the causes, symptoms and remedy for such troubles, that one should be sure that the noise is in the dynamo or motor in question rather than caused by the engine or other piece of machinery connected to it.

Noise may be due to vibration in the armature or pulley, one or both of which are out of balance.

The symptom is a strong vibration felt when the hand is placed on the machine when running. The character of the vibration as well as the sound changes as the speed changes.

The best way to remedy this trouble which by the way is a common one, is to remove the armature from its bearings, place it on knife edges allowing it to turn freely. The heavy side will turn down and by adding leaden weights or driving metal plugs into the light side a perfect balance may be obtained.

The caution to be observed in such a job, is to be sure that the weights are firmly secured so that there will be no shifting while the machine is in motion.

There is also danger of grounding or short-circuiting some of the armature coils unless special precaution is taken to insulate the weights which are to be added.

Very frequently it will be found that the pulley is out of balance. This should be balanced separately from the armature. It is possible to obtain

a perfect balance with the pulley on the armature shaft, still it will give the shaft a strong tendency to "wabble" when running at a high speed.

Noise is often caused by the armature striking the pole pieces. This trouble is readily detected by placing the ear close to the pole pieces and by stopping the machine and making an examination of the armature body, to see if it shows any sign of abrasion.

The clearance between armature and pole pieces ranges from 1/16 to 3/16 of an inch. A slight wearing away of the bearings or a spring in the shaft will cause the armature body to strike the pole pieces after breaking the binding wires and allowing the conductors to fly out.

The remedy is obviously to straighten the shaft or renew the bearings as the case may be.

Singing or hissing of the brushes is due usually to a rough or eccentric commutator. With carbon brushes, squealing and hissing will be caused by the use of carbons which are gritty or too hard. Vertical brushes or radial brushes and brushes which by chance have been inclined against the direction of rotation are subject to this trouble. It may be readily located by shifting or altering the tension of the brush-holders.

In event of a rough commutator, give it a thorough sand-papering and in extreme cases have armature put in lathe and have the commutator turned up.

Carbon brushes sometimes squeak at slow speed, decreasing as the motor attains full speed. Usually all that is necessary to remedy this trouble, is to lubricate the commutator with a cloth moistened with a few drops of oil.

A hard carbon brush will sometimes squeal in spite of all one can do. Then it remains only to change the brushes, being careful to select carbons of softer grade. Of late graphite brushes have been tried with great success on motors.

Other causes of noise about the motor are, a pounding of the belt joint on the pulley face as it revolves at high velocity. This is aggravated by poor joints and the small pulley sometimes found on motors. In such cases use only endless belts; slipping of the belt emitting at intervals a squeak; and a pounding of the armature against the bearings, due to too great lateral motion caused by the motor being out of line, is trouble which may result in serious wear.

There is a tendency in some machines to a loud humming noise; especially is it the case with alternators. To remedy this as far as possible, is a matter of first construction and has been accomplished in some machines by sloping off the edges of the pole pieces and in others by winding the coils of the armature in spiral slots cut in the armature body, so that an armature tooth does not pass the edge of the pole piece all at once.

Aggravated humming in an alternate is sometimes due to sympathetic vibration in the iron frame of the machine and can be remedied by changing slightly the proportions of the frame or of the magnetic circuits, but this also is a question of first design and quite out of the province of the engineer in charge to try to remedy.

The next question is one of speed. When the speed of a motor is either too high, or too low it is an indication of trouble, and when it is present the current should be at once shut off and a careful investigation made.

With a motor, very frequently, the trouble is due to an overload.

The symptoms are: armature runs more slowly than usual; a bad sparking at the commutator, varying as the maximum load is thrown on; the ammeter also, when in circuit, indicates excessive current and consequently heating of the armature (these symptoms are equally applicable to the case of overload on a dynamo). The remedy in each case, obviously, is to reduce the load: with the dynamo by taking off lamps, and in the case of the motor reducing the mechanical work to be done; decrease for example, the diameter of the driving pul-

ley, increase the diameter of the driven pulley.

Other causes for decrease in speed may be summed up as follows: Short circuits in the armature, Cases where armature has been patched up by cutting out coils, Armature striking the pole pieces, and great friction against the body of the machine. Bearings being too tight or out of line, friction due to hot bearing. Most of these symptoms and means of remedy have been treated, already under other heads.

When, however, the field magnetism of a motor becomes weak for any cause, such as short circuits in a portion of one or both coils, it will run either too fast or too slow.

The accompanying symptoms are a heating of the field coils and a bad sparking at the commutator.

In such cases the current should be shut off instantly, a test made on the fields with a bridge and if found at fault, that is, not up to the standard resistance, should be rewound.

This trouble, in the case of the dynamo, will cause the machine to fail to generate, which will be discussed more in detail later.

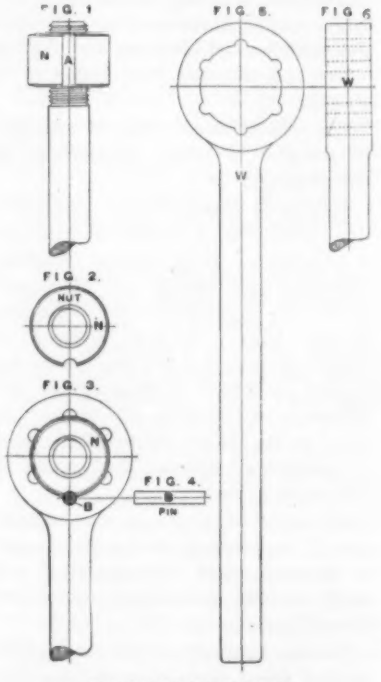
Cylindrical Nuts and Milling Cutters.

ROBERT GRIMSHAW.

It is strange how customs cling to even the most progressive designers and constructors. How many years the "four-square" and "six-square" nuts have been handed down, and their time-bills with them, would be hard to say.

They are expensive to punch or to forge and far more expensive to finish; the punches and dies are hard to keep in shape and lose their size as well as their outline; and when it comes to planing or milling or filing they cost more than they are worth. Even the draughtsman who conscientiously lays down their "panes" with due regard to perspective and conventionally rounds off the tops and bottoms with circular curves centered according to the system taught since "the memory of man runneth not to the contrary," loveth them not; and the fitter, the assembler, the adjuster and the long line of users and repairers who have to do with the "hex" and its accompanying (or appropriate and often missing) wrenches, makes uncomplimentary remarks regarding them from Dan to Beersheba, and as far back as his tongue holdeth out.

The cylindrical nut is so much cheaper to make, and above all things to provide countersinks for, that it is a wonder that the few brave and progressive souls who have advocated it and the fewer enterprising constructors who have used it, have not had more followers.



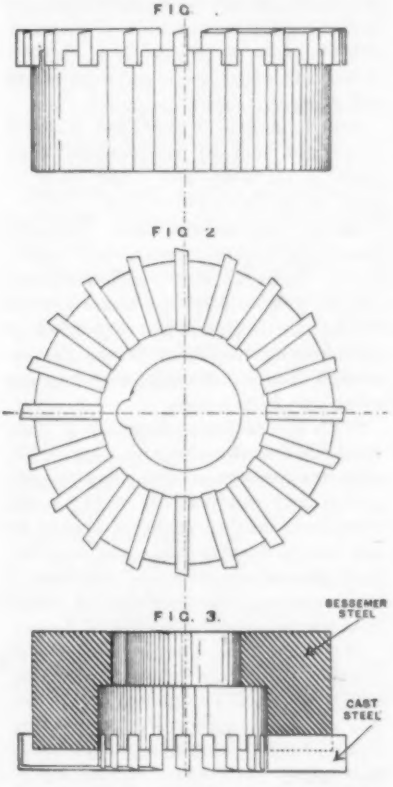
NUTS AND WRENCHES.

In the Bollinckx Works in Cureghem-lez-Bruxelles, (Belgium) they make a specialty of Corliss engines, and have quite a reputation for the solidity and fine finish as well as the originality in design combined with the good performance of their work.

Among the most noticeable of the

minor details about their engines, are the nuts used on the bolts of flywheels and foundation bolts. These nuts "N" are cylindrical, as shown in the top views in Figs. 2 and 3; and have a groove "A" of semicircular section, milled down one side, as seen in Figs. 1, 2 and 3.

The wrench "W" used with these nuts is illustrated in Figs. 5 and 6, it is bored to fit the exterior of the nut and is supplied with half a dozen or more semi-circular grooves corresponding with those on the side of the nuts. The connection is made by a short cylindrical steel pin "B" (Fig. 4).



THE BOLLINCKY MILLING CUTTERS.

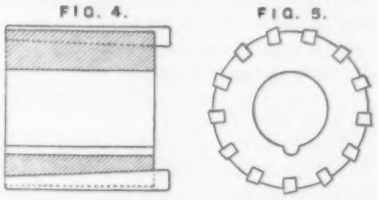
It is cheaper to make six grooves in a wrench and one in each of a dozen or a hundred nuts than to make six flutes in the sides of all of the nuts and one in the wrench as is sometimes done.

Another specialty of this same firm that is worthy of imitation is its milling cutters. It does about a score of things hydraulically that other establishments do in some other way, and it has reduced the construction and appliances of hydraulic machinery to an easily worked system, not merely for heavy work but with small and light pieces.

For example: ruffs, reamers and other bladed cutters are made with a body or core of Bessemer steel provided with suitable grooves, in which tool steel blades are inserted by hydraulic pressure so that they will stay where they are put. These latter are then dressed to dimensions on an emery wheel.

The advantage lies not merely in the strength and economy but in the tools keeping their size except for the loss by wear. A workman cannot knock out reamer blades by tapping with a hammer, shim them out with brown paper and then try to get them back to size.

Figs. 1, 2 and 3 show side face and sectional views of a cutter thus made,



and Figs. 4 and 5 respectively, a reamer made on the same system. It will be noted that these works use cylindrical keys.

Plain Truths.

M. E. HARRIS.

Any one who constructs a building in which steam power and heating is required and finds the plant is wasteful of fuel, ruinously expensive to operate, or in short, is running them into bankruptcy, are themselves almost entirely to blame.

Such results are in most cases attributable to the fact that the engineering of architects is not a success.

Their work of making plans or specifications for buildings is mostly imitative. The architectural designs of other buildings are reproduced with the ideas and wishes of the prospective owner, incorporated as plans and specifications of the new structure.

It is when the architect undertakes something he does not understand that he displays his genius for originality, namely in the arrangement of power, heating, lighting, etc.

In these he seems to endeavor to have each job arranged more awkwardly than the last. Crowded, dark, poorly ventilated and inconvenient engine and boiler rooms are his specialty.

Inadequate power, waste of steam, trouble with the smoke inspector and big coal bills are the fruit of his labors.

Sometimes a contractor, having regard for doing correct work and who is mercifully inclined towards engineers and firemen who may have to run the plant, may be able to prevent in a measure such an unpleasant state of affairs, still it too often happens that the architect is the "whole thing."

It would prove an interesting sight to witness the handling of some plants by those who profess to be competent to plan their erection.

Somehow the one who seems to be so all-important, finds himself helpless when it comes to doing work with the botched, and ill contrived creation which he has caused to be put together.

The engineer must then be called upon to manage the machinery, which they considered he knew too little about to superintend its erection, and thus he becomes the scapegoat and receives the blame for anything which seems to go wrong.

For instance: Is the building insufficiently heated? Then the engineer is at fault. "Doesn't shovel coal enough," you know.

Does the chimney smoke? Again the engineer is at fault. "Shovels too much coal," you see, of course the design of the furnace and chimney has nothing to do with the case.

Does the engine prove unable to develope the required power? Again its the engineer's fault. "He does n't keep up enough steam, as it were."

The safety valve blows off considerable in his efforts to do so. He's at fault again. "Keeps up too much steam, of course." Though there are many plants where a variation of five pounds in boiler pressure will cause either a wasteful discharge of steam or a slowing down of the power.

Many people are slow to accept new ideas, no matter how great their utility may be or how beneficial. It seems easier to repeat the errors of others than to adopt new theories which are distinctly in advance of the old.

Still it is safe to say that whoever is caught once by an architect engineering (?) work will steer clear of such mistakes in the future.

Many capitalists have invested money in building enterprises, apartment houses and manufacturing blocks, only to find that instead of deriving an income, the expenses of maintaining the plant has so far exceeded their calculations that they are often run with a loss.

With the engineer economy of fuel, smokeless combustion and steam economy are matters of every-day investigation and practice. It would seem, therefore, that an engineer should be the one to furnish plans and superintend the construction and erection of the machinery, the operation of which they are to be held responsible.

Three or four months salary for "merely standing round watching things" appears a tremendous expense. But the money paid for shovelling the wasted fuel in years to come is a great deal more.

Moral: Have your engineer superintend the construction and erection of the machinery to be used in his department.

—Since the imposition by Russia some years ago, of duty on Indian jute, the importation of the lower qualities of fibres, of which grain bags are manufactured is fast becoming extinct, while for the superior quality a moderate demand still exists.

DYEING DEPARTMENT.

Dye Recipes for September.

The following recipes appear in the Dyers' Supplement, which is issued each month by the TEXTILE WORLD. The Supplement contains the colored samples, dyed according to recipes given. The selection of samples is carefully made, and it is the aim to show shades which are of especial interest to the dyer, and which the requirements of the market demand. The Dyers' Supplement is a 16 page pamphlet, in convenient form for preservation. Subscription price for the TEXTILE WORLD with the Dyers' Supplement is $3.

RECIPE NO. 129.

Light Bluish Green on Worsted Yarn.

Acid Green 5921 on 100 lbs. worsted yarn.

Prepare dye bath with

¼ lb. Acid Green 5921.
(The Hanna-Schoellkopf Co., Philadelphia, Penn.)
3 lbs. Blue Vitriol.
10 lbs. Glauber's Salt.

Enter in yarn at 130° F. Bring to boil while turning, and turn to shade at that heat.

Acid Green 5921 comes in the form of a dark green powder; very soluble; works slowly and evenly on the fibre. It will combine with other acid dyes for various shades.

RECIPE NO. 130.

Brown on Cotton Yarn.

Rhine Brown G G on 100 lbs. cotton yarn.

Prepare dye bath with

3 lbs. Rhine Brown G G.
(O. S. Janney & Co., 810 Letitia St., Philadelphia, Pa.)
2 lbs. Soda.
20 lbs. Common Salt.

Enter in yarn at boil and turn one hour at that heat. Rinse. For future kettles, use less color.

The Rhine Browns are something new on the market. There are three shades of them, and, according to the results obtained from them, they will be found to be excellent for dyeing level and fast shades, and when treated in a second bath of bi-chromate of potash and blue vitriol, extremely fast shades are produced. The Rhine Browns are adapted to the dyeing of mixed goods, by using a mordant of Glauber's Salt only. (See Recipes 115 and 116, August, and Recipe 135 this issue).

RECIPE NO. 131.

Slate on Cotton Flannel.

Vidal Black on ten pieces cotton flannel.

Prepare dye bath with

2 lbs. Vidal Black.
(Sykes & Street, 85 Water St., New York.)
50 lbs. Common Salt.
2 lbs. Carbonate of Soda.

Enter in cloth at 130° F., bring temperature to 200°, and turn one hour at that heat. Wash, and run for one-half hour at 150°, in a separate bath of

2¼ lbs. Bichromate of Potash.
2¼ lbs. Sulphuric Acid.

Wash.

Very fine shades of slates, pearls, drabs and grays can be dyed from small quantities of Vidal Black. The colors that are fixed in a separate bath of Bichromate of Potash and Sulphuric Acid are very fast. Vidal Black can also be fixed with sulphate of copper and sulphuric acid. The latter way produces a different shade. Vidal Black dyes a fine shade of black, which is very fast to light, washing, soap, etc. It will not rub off or run into white when washed together. (Vidal Black appeared in Recipe 108, July, 1897).

RECIPE NO. 132.

Black on Worsted Yarn.

New Azo Violet Black B on 100 lbs. worsted yarn.

Prepare dye bath with

6 lbs. New Azo Violet Black B.
(C. Bischoff & Co., 87 Park Place, New York.)
2 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 140° F. Bring to to boil while turning. and turn to shade at that heat.

New Azo Violet Black B comes in the form of a dark brown powder, very soluble. It is a penetrating dye, going on to the fibre slowly and evenly. It is fast, and will combine with other acid dyes for shades.

RECIPE NO. 133.

Violet Red on Worsted Yarn.

Fast Acid Violet R on 100 pounds worsted yarn.

Prepare dye bath with

1 lb. Fast Acid Violet R.
(Victor Koechl & Co., 122 Hudson St., New York.)
4 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 120°. Bring to boil while turning, and turn to shade at that heat.

Fast Acid Violet R dyes a reddish shade of violet, and being a fast color, dyers will find it to be of great value on account of its fine red cast and pureness of shade. It will combine readily with Patent Blue. (See Recipe 113, and 138, this issue), and other acid colors for producing different shades.

RECIPE NO. 134.

Dark Blue on Cotton Yarn.

Triamine Black B T on 100 lbs. cotton yarn.

Prepare dye bath with

3 lbs. Triamine Black B T.
(A. Klipstein & Co., 122 Pearl St., New York.)
15 lbs. Glauber's Salt.

Enter in yarn at boil, and turn to shade at that heat.

Triamine Black B T is another of the fast blacks introduced by this firm. Besides dyeing a one-dip blue at a very low cost, a very fast and beautiful shade of black can be produced by diazotizing and developing it separately. It will also combine with other direct dyes for shading. (See Recipe 123 in the August issue, for a light blue on cotton yarn, from Triamine Black B.)

RECIPE NO. 135.

Brown on Cotton Yarn.

Rhine Brown B on 100 lbs. cotton yarn.

Prepare dye bath with

3 lbs. Rhine Brown B.
(O. S. Janney & Co., 8-10 Letitia St., Philadelphia, Pa.)
2 lbs. Soda.
20 lbs. Common Salt.

Enter in yarn at boil, and turn one hour at that heat. Lift out, and turn for 15 minutes at boil, in a second bath of

1 lb. Bichromate of Potash.
2 lbs. Blue Vitriol.

Wash.

By an after treatment of blue vitriol and bichromate of potash, Rhine Browns are made very fast, and can be washed along with white and not stain. They also dye a fine, full shade in a direct bath, producing level dyeings. The colors are very soluble, and the cost of dyeing is low. (See Recipes 115 and 116, and Recipe 130, this issue).

RECIPE NO. 136.

Violet Blue on Cotton Yarn.

Indol Blue R on 100 lbs. cotton yarn.

Mordant cotton in the usual way with Sumac and Tartar Emetic.

Wash, and dye in a bath with

2 lbs. Indol Blue R.
(New York & Boston Dyewood Co., 55 Beekman St., New York.)
2 lbs. Alum.

Enter luke warm. Bring up to 185° while turning, and turn to shade at that heat.

Indol Blue is a very fast color, and is a correct substitute for indigo, producing excellent dyeings which are fast to washing. It will also be found of great advantage to silk dyers, on account of its fastness to washing. (See Recipe 102).

RECIPE NO. 137.

Orange on Cotton Yarn.

Golden Yellow G on 100 lbs. cotton yarn.

Prepare dye bath with

2 lbs. Diphenyl Fast Yellow G.
(John J. Keller & Co., 104 Murray St., New York.)
20 lbs. Common Salt.

Enter in yarn at boil, and turn one hour at that heat.

Diphenyl Fast Yellow G, dyed with two pounds of color, will produce a full

shade or orange. The color given here is well adapted for cotton piece dyeing, also for raw stock, and as it is a one-dip color, it will be a great help to the dyer who has been in the habit of dyeing the old chrome and sugar of lead yellow, as it will save time and expense. (See Recipe 117 in August issue).

RECIPE NO. 138.

Light Greenish Blue on Worsted Yarn

Patent Blue A on 100 lbs. worsted yarn.

Prepare dye bath with

1 lb. Patent Blue A.
(Victor Koechl & Co., 122 Hudson St., New York.)
3 lbs. Sulphuric Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 120°. Bring to boil while turning, and turn to shade at that heat.

Patent Blue A will combine readily with other acid dyes in shading for browns, blues, etc. Patent Blue can also be dyed in a chrome mordant. (See last month's Recipe 113).

RECIPE NO. 139.

Black on Cotton Yarn.

Swiss Black B G on 100 lbs. cotton yarn.

Prepare dye bath, to start, with

8 lbs. Swiss Black B G.
(The Stone & Ware Co., 157 Maiden Lane, New York.)
20 lbs. Salt.

Enter in yarn at boil. Turn one hour at that heat.

For second and future kettles, use

5 lbs. Black.
5 lbs. Salt.

Swiss Black is a very fine black, dyeing perfectly level shades on yarn, raw stock or piece goods. It also dyes an even shade of black on mixed cotton and wool goods. It is fast, and very soluble.

RECIPE NO. 140.

Very Light Blue on Worsted Yarn.

Phenocyanine T B on 100 lbs. worsted yarn.

Mordant at boil for 1½ hours, with

2 lbs. Bichromate of Potash.
1½ lbs. Tartar.

Wash off and dye in a bath with

1½ lbs. Phenocyanine T B.
(A. Klipstein & Co., 122 Pearl St., New York.)
1 lb. Acetic Acid.

Enter in yarn at 120°. Bring to boil while turning, and turn to shade at that heat.

For light stripings on worsteds or woolens, the above color will be found just what is wanted. It is fast to all tests, and works on light and dark shades very evenly. It is fast to soap and light.

RECIPE NO. 141.

Medium Blue on Worsted Yarn.

Alizarine Lanacyl Blue BB. on 100 lbs. worsted yarn.

Prepare dye bath with

1 lb. Alizarine Lanacyl Blue B B.
(Wm. J. Matheson & Co., 182 Front St., New York.)
5 lbs. Acetic Acid.
10 lbs. Glauber's Salt.

Enter in yarn at 130°. Bring to boil and turn one hour at that heat. Then add

5 lbs. Acetic Acid.

Turn 20 minutes, and rinse.

Alizarine Lanacyl blues and violets will be found to be very fast colors. The powders are easily dissolved, and work on the fibre readily. They are well adapted for worsted and other fine goods, also to stock dyeing. (See Recipes 51, 56 and 126).

RECIPE NO. 142.

Very Dark Blue on Woolen Cloth.

New Belgium Blue on 100 lbs. woolen cloth.

Mordant for 1½ hours at boil, with

6 lbs. Belgium Blue Mordant.
½ lb. Bi Chromate of Potash.

Finish with

16 lbs. New Belgium Blue.
(Anchor Color Mfg. Co., 462 Cherry St, New York.)

Enter in cloth at 120°. Bring to boil while turning, and run 1½ to 1¾ hours at that heat.

New Belgium Blue being a new color will be found by dyers of woolen and worsted cloth to be a very fine and also

a cheap and fast color. It is well adapted for fine worsted yarns and piece goods, also for raw wool. The color is fast and dyes very level on the fibre. New Belgium Blue comes in the form of a powder, and is very soluble in hot water.

RECIPE NO. 143.

Green on Cotton Yarn.

Benzo Dark Green BB on 100 pounds cotton yarn.

Prepare dye bath with

3 lbs. Benzo Dark Green BB.
(Farbenfabriken of Elberfeld Co., 40 Stone St., New York.)
25 lbs. Glauber's Salt.

Enter in yarn at boil, and turn one hour at that heat.

Benzo Dark Green BB produces, according to this recipe, a very full and fine shade of green, and as it dyes in one dip, in a short space of time, will make it a popular color in the dye house. It does not rub off, and will combine with the Benzo and other direct dyes. (See Recipe 125, August issue).

RECIPE NO. 144.

Black on Woolen Cloth.

Black B No. 4 on 100 lbs. woolen cloth

Prepare dye bath with

6 lbs. Black B No. 4.
(Anchor Color Mfg. Co., 462 Cherry St., New York.)
3 lbs. Oil of Vitriol.
10 lbs. Glauber's Salt.

Enter in yarn at 120°. Bring to boil while turning, and turn to shade at that heat.

Black B No. 4 produces, as by this recipe, a full shade of jet black, the amount of color used being very small. The shade is a full, bloomy black, is fast, and will stand air and soap.

—The cotton industry, formerly almost exclusively localized in Lancashire, is today cosmopolitan. Unfortunately for Lancashire, numerous adverse influences have for almost a quarter of a century unfavorably affected that district.

New Dyes.

We give in the September Dyers' Supplement a number of recipes and samples of colors that are timely, and should be of interest to dyers. We desire to call especial attention to the following dyes which have not heretofore appeared in our recipes.

Sykes & Street, New York, furnish their Vidal Black, for the production of a slate on cotton flannel, in recipe 131. Although this dye has appeared in a former recipe, sometime ago, we take this opportunity to again call attention to it, because it has received such general acceptance, as offering advantages to the dyer, as a cheap and efficacious dye giving great intensity of color. This is an aniline dye, soluble, and has an extraordinary affinity for cotton, and for all other vegetables, and even animal fibres; is fast to soaping and does not green.

Recipe 132 gives an excellent black on worsted yarn, from New Azo Violet Black B, furnished by C. Bischoff & Co., New York. This color is absolutely fast to sunlight. When looking on it, it will show a black, but looking across it, it will have a fine purple shade. It can be used for combination purposes, such as navies, browns, etc.

An attractive violet blue on cotton yarn is to be seen as the result of using Indol Blue R, furnished by the New York & Boston Dyewood Co., New York, in recipe 136. This dye has very considerable merit, and in certain cases replaces indigo very well indeed. This dye was introduced to the trade last February, and has been favorably received. It is a basic coloring matter, which, on account of its excellent properties, deserves to be mentioned among indigo substantives for cotton and linen dyeing. On cotton, as will be seen by our sample in the Supplement, it yields a brilliant and full blue shade. The colors produced by it are fast to acids and light. It is well suited for topping substantive dyeings direct, and for this reason is especially valuable for dyeing linen, on account of its penetrating the fibre well.

In recipe 139, we have a black on cotton yarn, obtained from Swiss Black B G, furnished by the The Stone & Ware Co., New York. With the percentage of coloring matter used in this recipe, a fine jet black is obtained, fast to light, acid and washing. It can be used either on cotton and one-half woolen material, dyeing both fabrics equally well at boiling point. There are other brands of Swiss Black namely, D and B.

A. Klipstein & Co., New York, show in recipe 140 a very light blue on worsted yarn, obtained from their Phenocyanine T B, which produces bright shades, fast to fulling, and fairly fast to light, as will be seen in the sample appearing in our Supplement. This dye gives a remarkably fine shade for light colors. The same can be said for heavier shades.

Recipe 141 gives a medium blue on worsted yarn, obtained from Alizarine Lanacyl Blue B B, furnished by Wm. J. Matheson & Co., New York. There are several brands of Alizarine Lanacyl Blue that can be used on wool, cotton and wool mixed, silk, and cotton and silk mixed goods. These different dyes can be mixed at will with each other, for the production of a great variety of blue shades. They are especially useful for dyeing piece goods.

We think that dyers will be particularly well pleased with the specimen of very dark blue on woolen cloth, shown in recipe 142, obtained from the use of New Belgium Blue, furnished by the Anchor Color Mfg. Co., New York. This dye is used for worsted and mixed goods, and is successfully used both for wool and yarn dyeing. We call attention to the comments of our dyer.

—Belfast, Ireland, in 1838, was "the great emporium of the linen trade of Ireland, and the centre to which the linens, not only of the several counties of Ulster, but also of the linen-weaving districts of the West of Ireland, were sent for sale."

Lustre on Cotton.

Seldom has a patent produced such excitement in textile circles as that protecting Thomas & Prevost's process for producing a silky lustre on cotton by mercerization, that is to say, by treating the fabric with soda lye while it is stretched. Their process has proved itself most valuable in every respect for improving the appearance of cotton, so that it is not to be wondered at if all kinds of researches have been made with the object of simplifying it, of making it give a better result, or of attaining the same object by totally different means. Nevertheless, no success worth remark has attended these efforts, although a few purely mechanical improvements which appear to present some interest have been made in the working of the process.

An entirely new turn has, however, been given to the business writes Dr. A. Buntrock, a German authority, calling attention to certain old publications treating of the same matter. These raise the question as to whether Thomas & Prevost's patent is valid in Germany, and whether any person interested cannot make use of the process at his pleasure. To clear up this matter a special committee of experts of the Societe Industrielle de Mulhouse has been appointed, but no definite conclusion has been published. It may be useful to follow up the question historically, so that its development may be clearly understood.

In 1850, J. Mercer patented in England a process for increasing the strength, the closeness, and the capability of being dyed, of cotton. His method consisted in thoroughly soaking the fabric with water, wringing it, and then passing it through soda lye, of from 34 to 38 deg. Be., at a temperature not exceeding 16 deg. C. The stuff was then washed, wrung, rinsed without previous drying in clean water, passed through dilute sulphuric acid, and finally thoroughly rinsed. Mercer says that cotton so treated undergoes certain changes, and receives

new and valuable properties. The pieces lose both in length and in breadth but become thicker and closer in texture, so that the lye produces the same effect on calico that milling does on woolen goods. At the same time the threads become less easily torn, are heavier than they were before the treatment with lye, and have their capacity for taking up dye greatly increased, whether the dye is applied in the dye bath or by printing. Mercer also describes an apparatus for continuous working.

In place of the soda or potash lye, sulphuric acid of 50 to 51 deg. Be. can be used at the same temperature as the alkali. The process is carried out as described above with the caustic alkali, except that the acidification is naturally unnecessary. Mercer also used a solution of chloride of zinc of 61 deg. Be. If fabrics composed of a mixture of cotton and wool or cotton and silk have to undergo the treatment with caustic alkali, Mercer recommends that the temperature should not exceed 10 deg. C., and that the strength of the alkali should not exceed 25 deg. Be., or else the animal parts of the fabric will be injured. The beneficial effects on the cotton are exerted just as well as by the stronger lye at the higher temperature and a lye as weak as 14 to 15 deg. Be. answers quite well. Further, Mercer found that the soda lye acted more and more strongly on the cotton as the temperature got lower. Mercer's patent did not meet with any very wide adoption.

In 1887, Lightoller and Longham took out a patent in England for increasing the strength of cotton by treatment with sulphuric acid or chloride of zinc solution in suitable pieces of apparatus; and in 1889, H. A. Lowe took out an English patent for increasing the lustre, the touch, the strength, and the dyeing power of cotton by acting upon it with soda or potash lye, with or without the addition of zinc oxide. The same patentee modified his process in 1890. In this he describes his procedure more accurately and extended it to other vegetable fibre besides cotton. The description of his process runs nearly as follows:—When cotton is acted upon with caustic alkalies, soda lye for example, a combination takes place with the soda forming a soda-cellulose, and the cotton becomes elastic and translucent, at the same time contracting. This last effect has to be prevented, and this is done by stretching the fabric mechanically, either during the action of the caustic alkali or shortly afterwards. This stretching has to take place before the material has lost its temporary extensibility. As long as the threads are soaked with lye they are elastic, and contract again if the stretching is suspended; but if the alkali-cellulose is decomposed by washing with water for example, the material loses its elasticity, although not its extensibility. The latter property disappears only gradually when the fibres do not undergo any intermediate drying.

The material to be treated is placed in the lye for from one to fifteen minutes; the time and also the strength of the lye are varied according to the closeness of the fabric. The extreme limits of lye strength are 16 and 40 deg. Be. To prevent the contraction, which cannot be done away with by washing away the lye with water once it has taken place, two methods are prescribed. One is to put the cotton into the lye in a stretched state, and to keep it stretched till after it has been washed, and another is to stretch it after the treatment with lye and during the washing, or else between the washing and the drying. The best method is to keep the cotton stretched during the whole process, when it is in the form of yarn, but heavy fabrics and warps during the rinsing with water, while ordinary fabrics and cops are not stretched until after the alkali-cellulose has been decomposed by water, but before the cotton has lost its extensibility by being dried. After the treatment with lye the cotton is best washed with warm water and then freed from the last traces of alkali by means of dilute acid. The lye washed out can be con-

centrated for use over again. The operation can hence be divided into three parts, (1) the treatment of the cotton with soda lye, (2) the stretching of the cotton as long as it can be stretched, and (3) the removal of the soda from the fabric and the regeneration of the former by evaporation. By this process any kind of cotton can be treated in a stretched condition in whatever manufactured state it may be. The resulting material is distinctly stronger than ordinary cotton. It absorbs moisture more readily, and is closer and more lustrous. In addition, the mercerized cotton requires a smaller quantity of dye to produce any given depth of shade than ordinary cotton does, and also receives a color which is faster against light and against chemical reagents than unmercerized cotton receives from the same dyestuff.

In 1895, Thomas & Prevost applied for a German patent for mercerizing vegetable fibres while stretched, and the patent was granted in 1896. The specification runs as follows:—If vegetable fibres are exposed to the action of strong alkaliene lyes or of strong acids, they become altered chemically, and receive greatly increased power of taking up all dyes and mordants. This circumstance can be taken advantage of to impart dark colors and blacks to the cotton in mixed fabrics and other shades at will to the other fibre present. But the contraction of the vegetable fibres prevents the utilization of this process in practice, unless the contraction is prevented by stretching during the action of the alkali. The best strength of lye to use is from 15 to 32 deg. Be. Lye of such strengths has no injurious effect upon the strength of silk or cotton if used cold, but rather increases it. If acid is used instead of alkali, sulphuric acid should be employed, which marks 49.5 to 55.5 deg. Be. But in this case the process must be conducted more carefully than with alkali and must not last so long, and the final washing must be very thorough. In any case the process is not a long one especially if the cotton has been first freed from all traces of grease and is treated in a moist state. The close of the reaction is recognized by the parchment-like appearance which the threads then assume.

The contraction of the vegetable threads is prevented as follows:—If it is a case of a fabric having a silken warp and cotton weft, the mercerizing can take place after the weaving, if the fabric is stretched in the direction of the weft. As soon as the mercerizing is finished, the stuff is sprinkled with water till the very tight stretching produced by the alkali relaxes. The stuff is then removed from the machine and neutralized in an appropriate bath; it will then not contract further. If the process has to be carried out with goods which cannot conveniently be stretched in the piece, they are mercerized before they are woven, as the yarn can easily be stretched. The specification claims novelty in mercerizing vegetable fibres with alkalies or acids, characterized by the fibres being subjected to the action of the bases or acids, while tightly stretched either as yarn or after weaving, and washed while the stretching is maintained, so that contraction of the fibre is avoided.

In a supplementary patent Thomas & Prevost say that the contraction of the threads when they are treated with acids or alkalies can be done away with after it has occurred by stretching, while the stuff is still wet with the lye. In this case, too, the washing must take place while the material is stretched. The specification runs as follows:—"The process of the main patent is so far altered that the vegetable threads are treated either in yarn form or after weaving by means of bases or acids without being stretched, and the contracted fibres are stretched to their former dimensions while still soaked with the mercerizing solution. They are then washed while still stretched, until the stretching relaxes spontaneously."

Although the original patent of Mercer, and also that of Lowe, found no

important adoption by the trade, those of Thomas & Prevost have turned out to be of unusual value, for the cotton stretched to its original length after the mercerizing, that is, after having been at first allowed to contract, shows, what Thomas & Prevost do not mention in their German patent, a silky lustre. As mentioned above, Lowe mentions in his now expired English patent, that the cotton, whether stretched during the mercerization or after it, becomes more lustrous than at first. In all other points the two processes are very similar, but although Lowe mentions the use of sulphuric acid in his last patent a use which Mercer had already recognized, yet this method of producing silky lustre by means of concentrated sulphuric acid is difficult of execution and is therefore only of subordinate technical import. It must be borne in mind under all circumstances that Thomas & Prevost discovered their process independently of Lowe, and opinions are not divided as to the fact that Thomas & Prevost alone have introduced the process of giving to cotton a silky lustre by means of mercerization. In England, Thomas & Prevost's patent has fallen through on the ground of the existence of the older patent of Lowe, so far as concerns the treatment of cotton with caustic alkali while in a stretched condition. In Germany, their patents are still sub judice, and unauthorized use of their processes is not yet possible.

Indigo.

The plant from which this valuable dye is made is cultivated largely in India and in small quantities in Java, Brazil and Guatamala. The principal coloring matter is indigotine, varying in quantity from 25 to 80 per cent.

This dye was first used by the ancients under the name of Indicum. It did not come into extensive use until some time during the 16th century. It was kept out of use for a long time in England and France by a special law enacted under the claim that it was a fugitive color and injurious to wool fibre. It was denouced as a dangerous drug and its use forbidden in England by act of Parliament during the reign of Queen Elizabeth. The act authorized the appointment of searchers to burn it in every dye house where it could be found. The act remained in force nearly 100 years or until the time of Charles II. Chemists at last proved that indigo, when properly used, was absolutely fast to soap and sunlight and one of the most valuable dyes that can be used on textile goods. It was cultivated in the East Indies about the middle of the 17th Century from seed imported from Central America, and after the English took possession of Lower Bengal the cultivation of the plant and manufacture of Indigo became the principal industry.

The Indigo made at the European factories in Lower Bengal is considered the most valuable as they are more careful in the process of manufacture, keeping the vats in which the indigo plants are fermented as free as possible from weeds, sand and impure water. The indigo seed is usually sown in March or beginning of April. The plants grow rapidly and when the flower-buds begin to bloom in July the first cutting commences which is the best. After about two months a second cutting is made, then a third. After the first cutting the value diminishes. Indigo varies much in quality and it requires a great deal of experience and practical testing in order to become a good judge of its real value.

—It requires a genius of quite another order to understand the throbbing vitality of a vast factory, pulsating with an energy which, though it is not human, is nevertheless the translation into very forcible prose of man's highest faculties—imagination, invention, creation. One must isolate oneself in that clanking wilderness of noise before he can realize that it is human intellect which lit the match and fused into active combination the latent forces of inert matter.

QUESTIONS AND ANSWERS.

Under this head we undertake to answer, free of charge, to the best of our ability, any pertinent inquiry pertaining to textile matters received from any regular subscriber to the TEXTILE WORLD. Questions should be stated as briefly and concisely as possible. Inquiries pertaining to textile processes, machinery, improvements, methods of management, the markets, etc., are especially invited, as well as any legitimate discussion on the views expressed. All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith.

Purity of Potato Starch.

Editor Textile World:

Will you kindly give me a reliable test for the purity of potato starch. Nowadays, there is such general adulteration with the cheaper and weaker corn starch that it is very important to detect the presence of the adulteration that may appear in our purchases.

Ky. P. S. T.

The only means that we know of for ascertaining the impurities or adulteration in potato starch, is the microscope, and in order to obtain the best, or most satisfactory results by this instrument, it is important that it should be manipulated by one familiar with its use, and by an expert in detecting impurities in such articles as starch. We would suggest consulting a competent chemist.

Sponge Flocks.

Editor Textile World:

In the interest of a new and profitable industry, can you put me in communication with a party or parties who can reduce pieces of sponges, to or nearly to, the form of flocks, like woolen flocks made from the shearing machine.

Penn. S. T. T.

This certainly is a new industry, and we know of no one who can advise our correspondent respecting what he desires. Perhaps some of our readers can, and if so, we should be pleased to hear from them.

Book on Cotton Manufacturing.

Editor Textile World:

Will you inform me where I can obtain a book on the manufacture of cotton, from its early history to its present stage?

Alabama. F. A.

There is a large amount of reading matter on this subject, and we hardly know what book to recommend. We will suggest, however, among many other good books, the following: Cotton Weaving, by R. Marsden, $3; Cotton Spinning by R. Marsden, $1.75; Cotton Manufacturing, by C. P. Brooks, $2.25. In addition to these, there is a work on The History of Cotton Manufacture, by Baine. This work is considered a standard authority, and gives an excellent account of the history up to the middle of the present century.

Shirt Publication.

Editor Textile World:

Can you give me the name of a paper devoted to the shirt manufacturing trade?

New Jersey. G. S. C.

We do not know of any publication devoted exclusively to this trade. Information on this subject will have to be obtained from textile publications, as those devoted to the dry goods trade, etc.

Carbonizing Wool.

Editor Textile World:

Do you know of a book that I can obtain, treating on the different methods of carbonizing wool?

Rhode Island. J. W. S.

There is no book specifically on this subject, but the textile journals have more or less to say about it, and much information can be obtained of new methods by consulting the patent office records. Frequently parts of chapters are devoted to the subject in books on industrial chemistry.

Consumption of Cotton in Europe.

Editor Textile World:

Will you give me the consumption of cotton in Europe, not including that obtained from the United States?

N. C. J. W. B.

Our correspondent does not state the period which he desires us to cover, and, therefore, we will simply state that according to Ellison's figures, the deliveries to consumers from October 1, 1897, to July 31, 1898, were on the average, per week, to British spinners, of 529 bales, Brazilian; 7,230 bales, Egyptian; 671 bales, West Indian, etc.; and 307 bales, East Indian. To Continental spinners, 123 bales, Brazilian; 8,797 bales, Egyptian; 158 bales, Smyrna, etc.; 351 bales, West Indian; and 12,455 bales, East Indian. In other words, the weekly

deliveries to British spinners was 8,737 bales, other than American, and to Continental spinners, 21,884 bales.

Webb Cotton Press.

Editor Textile World:

I have noticed in the papers, reference made to a Webb cotton press. Do you know anything about this press, and where it is made?

Massachusetts. C. W.

There is such a press made by the Webb Press Co., Minden, La., where information, no doubt, can be obtained by writing to the company. We know nothing about the merits of the press. It is used for making the so-called square bale. Claims are made for it that it can give a density of forty pounds to the cubic foot, with ease.

Book on Sheep.

Editor Textile World:

Can you refer me to any practical books or articles on the subject of sheep raising which will apply to this part of the country?

Mass. J. S. C.

There is no book that treats on sheep husbandry, with special reference to the New England States. We should advise getting Henry Stewart's book on "The Domestic Sheep," price $1.50, 1898 edition. This is the best work that we know of, that is applicable equally to all parts of the United States.

Cotton Worsted Mills.

Editor Textile World:

I notice in your July issue, page 135, you speak of cotton worsteds as being made in some Rhode Island mills. Will you kindly give us the names of some of the parties who make these goods.

N. H. L. H. J.

There are a number of mills in that State that make this kind of goods. Among them may be mentioned, at random, the following: Wm. Tinkham & Co., Harrisville; J. T. Fiske, Jr., Pascoag; Maple Woolen Co., Mapleville; Nasonville Woolen Co., Nasonville; The Farwell Worsted Mills, Central Falls. These are a few.

Cotton Acreage.

Editor Textile World:

Will you please give me the acreage in the Southern States devoted to cotton, this year?

Penn. N. C. L.

The acreage planted in 1898, according to the Agricultural Bureau, Washington, is 22,460,000 acres, against 24,091,000 for 1897. According to this authority, there has been a decrease in 1898, as compared with 1897.

United States Debt.

Editor Textile World:

What are the authorizing acts under which the United States interest-bearing debt is contracted, also give the amount of the debt under these acts? X.

The interest-bearing debt of the United States, outstanding June 30, 1898, amounted to $847,367,470. Most of this comes under the authorizing acts of July 14, 1870, and January 20, 1871. Most of the balance of the debt comes under the authorizing act of January 14, 1875. A very small portion of the debt comes under the act of February 26, 1879.

Size of Wire.

Editor Textile World:

Will you kindly give me an accurate rule for finding the size of wire required to transmit a given current at a stated loss, voltage and distance?

Chicago, Ill. J. S. R.

The required diameter of a wire may be found by multiplying 10.61 by twice the distance in feet, multiply this product by the current in amperes which the wire is to carry, and divide by the number of volts to be lost in line. The quotient gives the area in circular mils. The diameter may be found by extracting the square root. After calculating see if the wire thus found has sufficient carrying capacity, if not a larger wire must be chosen.

Tables giving carrying capacity, circular mil equivalents, etc., may be found in many catalogues issued by insulated wire manufacturers, also in an article in December 1897 and January 1898. The above method applys to ordinary cases of alternating current distribution or non-inductive circuits.

Dynamo or Motor.

Editor Textile World:

Will you please tell me through your magazine how I can make a dynamo of a motor or a motor out of a dynamo?

Logan, Iowa. S. H. W.

A dynamo will usually act with equal efficiency when used as a motor and vice versa. To operate a dynamo as a motor it would be necessary to provide a starting box so that the current may be gradually applied.

To operate a motor as a dynamo make the power connections so that it will run at about the same speed as it did when

working as a motor, then if it is a shunt machine insert a rheostat or variable resistance in the shunt circuit for the purposes of regulation. If it is a series machine then a rheostat will be required large enough to carry the whole current, and a series motor must never be operatted without load.

Books on Sheep.

Editor Textile World:

Will you kindly inform us if there is a book published, treating of the different breeds and varieties of sheep, in connection with the character of wools produced by each.

New York. S. T. C.

The highest authority, and which covers this subject completely, fully illustrated, is a work entitled "The Sheep," by J. Bohm. This is published only in the German language, in two volumes. The standard English authority on this subject is a work on "Sheep: Breeds, Management and Diseases," by Wm. Youatt. An excellent American work is one by Henry Stewart, entitled, "The Shepherds Manual." This author has got out a more recent work than this, entitled "The Domestic Sheep." This latter book is one that we can particularly recommend as being fully up to date, and covers such subjects as the following: The Natural History of the Sheep; The Varieties and Breeds of Sheep; Science and Art of Breeding; Wool—Its History, Uses, etc. It is highly illustrated, and is a work of 371 pages. It can be got of the author, Chicago, Ill. Price $1.50.

Recarding Waste for Knitting Mills.

Editor Textile World:

Will you kindly furnish us with the names of two or three mills that recard waste clippings, pieces of stockings, etc. for knitting mills.

Tenn. T.

The usual course is for the mill to sell its waste outright to dealers in this class of goods. The stock could not be recarded without first being put through shoddy pickers, garnets, etc., and made into shoddy, after which it could then be carded. We would suggest that Chas. W. Becker of Amsterdam, N. Y., would be a good one to communicate with on this subject, also the Hudson Fibre Co., Hudson, N. Y. and J. L. & G. S. Banta, Amsterdam, N. Y. By consulting our Directory, you will doubtless find others in a similar line of business nearer to you. There are a number of such establishments in Cleveland, Ohio.

Book on Silk.

Editor Textile World:

Do you publish a book on the treatment of raw silk and the preparing of it for the weaver?

Pa. A. H. B.

There is no book in the English language, that we can recall at this moment, on this subject, except one, published a number of years ago, now to be found only in the hands of second-hand book dealers, entitled "A Treatise on Silk Manufacture," being a volume in the Lardner Cabinet Cyclopœdia. Reeling, throwing and weaving (plain, figured, damask, etc.), are treated therein. There is an excellent little work on "The Theory of Silk Weaving," by A. Wolfsenberger, that can be had of Paul Wenzel, 31 East Twelfth St., New York City. The Textile Manufacturer, Manchester, England, has had in times past some good articles, or a series on this subject.

Book on Finishing.

Editor Textile World:

Have you any up-to-date books on finishing worsted and woolens, or can you recommend me to any publishers of the same?

Mass. W. S.

There is no book on this subject, specifically.

Cotton Mills on the Pacific Coast.

Editor Textile World:

Will you please inform me if there are any cotton mills in Oregon, where located, kind of goods they make, etc. I am a mill operative.

Augusta.

There are no cotton mills in Oregon. The only one on the Pacific Coast is the California Cotton Mills, Oakland, Cal.; 10,000 spindles, 200 looms; makes duck, rope, twine, bags, etc. This mill is very successful and is about enlarging. The only other cotton mills west of Missouri are the Overland Cotton Mill at Denver; 17,000 spindles, 480 looms; making shirtings, sheetings, ducks, and drills, and the Kearney Cotton Mills, Kearney, Neb.; 15,000 spindles, 416 looms; sheetings.

Soap—Specific Gravity.

Editor Textile World:

I want to make a good scouring soap for woolen goods. I have bought soap from a reliable soap manufacturer, and I want to know what amount to use of soap, sal soda, or soda ash, and water, and what I should do in the way of making it; also I would like to know what is meant by 5° Beaume, to show the strength of a sulphuric acid bath.

Penn. J. A. T.

In regard to soap, you have asked our opinion about something that must invariably be left to the good judgment of the party using it. It is impossible to lay down any rules in the finishing department in regard to the use of soaps. If you have bought your soap of a reliable manufacturer, you have done the best that you can do, to that extent, but your experience must tell you how to use it. We never recommend one making his own soap. There are reliable soap manufacturers that can be patronized, and will furnish the article called for.

In regard to what is meant by 5° Beaume, it simply refers to a hydrometric specific gravity of your mixture of sulphuric acid and water. Specific gravity is usually indicated by either Beaume's or Twaddle's hydrometer, and 5° Beaume is the same as 7.4° Twaddle, which indicates a specific gravity of 1.037. If you should have a Twaddle hydrometer, and it should indicate 7.4°, the specific gravity would be obtained as follows: $7.4 \times 5 = 37$, to which add 1.000 with the decimal point placed as you will notice, making 1.037 the specific gravity. The relative value of Beaume and Twaddle, and the way to get at the specific gravity, can be obtained in most any scientific work on dyeing or chemistry. Sulphuric acid has a specific gravity of 1.84, or 168° Tw., or 65° Beaume. At this strength, it contains 98 per cent. of pure acid. You will thus see that 5° Beaume shows a comparatively weak solution with water.

Yarn from Cotton Waste.

Editor Textile World:

Can you give me the names of mills that manufacture cotton yarn from waste cotton.

D. E. V.

The Beacon Manufacturing Co., of New Bedford is, to the best of our knowledge, the only mill in this country that manufactures yarn from cotton waste. The Boston office is 251 Congress St.

Book on Carbonizing.

Editor Textile World:

Can you give me the name of a book that treats of the different processes of carbonizing wool?

Rhode Island. J. W. S.

The best information that you can obtain on this subject is that from the articles that occasionally appear in the Textile World and other like publications. There is no book especially on this subject, but chapters are devoted to it occasionally in books relating to the dyeing of textiles.

Book on Weaving, Calculations, Etc.

Editor Textile World:

I desire very much to get a book on weaving, that will furnish rules for finding the weight of yarn, weight of cloth, number of yarn to make certain kinds of goods, etc.

Va. T. V. W.

We would suggest our correspondent, who is engaged in the manufacture of cotton fabrics, securing one or more of the following books: Weaving Calculations, by C. P. Brooks; Cotton Weaving and Designing, by John T. Taylor. This latter book takes up the principles of designing, figures, calculations, etc. The most desirable works, we should judge, for the special use of our correspondent, would be the first one, and the one on Cotton Cloth Designing, by James Holmes. The designs of the last book are given in colors. The object of this work is to explain the principles of designing for simple woven patterns. No attempt is made to deal with jacquard patterns.

New Publications.

The Dyer's Bulletin. This is a new publication, issued from Philadelphia, the first number of which is now before us. It appears as a semi-monthly journal, devoted to practical dyeing, bleaching, printing, finishing, and allied industries, and is the official organ of the Foremen Dyers Mutual Improvement Association. The subscription price is $3. per year. It appears in an attractive form, with well selected reading matter, more or less illustrated, with a number of practical recipes and dyed samples. L. M. Carriat is manager, and A. Von Lehman, editor. This combination assures the publication of a good dyer's journal.

Transactions of the New England Cotton Manufacturers' Association. No. 64. This covers the proceedings and papers that were read at the annual meeting of this association, held at Chipman Hall, Tremont Temple, Boston, April 27-28, 1898. The report covers 300 pages. The papers that were read include the following: The New Roller Gin; Methods of Baling Cotton; Improvements in Packing; The Ring Traveller; The Shuttle Shifting Motion; Our Export Trade in Cotton Goods; The Renovation of a Cotton Mill, besides others. These papers and proceedings have been reported in this magazine at the time, and, therefore, it does not become necessary for us to allude to them further.

Modern Methods. We do not recall ever having seen a more interesting catalogue than that recently issued, under the above title, by the Link-Belt Machinery Co. of Chicago, officially known as their catalogue No. 24. It exemplifies the idea that pictures tell a much better story than volumes of reading matter. This catalogue, which contains 300 pages, is very largely made up of large half tone illustrations showing the different applications of their machinery. Typo-

graphically, it is of the highest order, and the work of compilation has been intelligently done. Until one has looked through this catalogue, it would never be realized the great variety of work accomplished by the conveying machinery and different applications of power made by these manufacturers. There is hardly an industry where their labor saving machinery cannot profitably be employed. While this is a speciality with them, they are also among the largest manufacturers of pulleys, shafting, hangers, and general power transmission, which includes the installation of rope transmissions. To the textile manufacturer, this catalogue cannot fail to be suggestive of opportunities for effecting radical saving. Any progressive manufacturer, even if he does not feel the present need, cannot fail to be interested in observing the many instances where the application of this machinery has effected great saving of manual labor. Not the least important feature is a convenient index, which enables the searcher to find just what he is after.

Yale Review. For August, 1898. New Haven, Ct., Tuttle, Morehouse & Taylor. This is the second number of volume 7 of this quarterly journal devoted to the scientific discussion of economic, political, and social questions, and edited under the auspices of Yale University. The leading and most interesting article to our readers, is the one by Edward Atkinson, on The Present Status of Cotton and Cotton Manufacturing in the United States. This article alone is well worth the obtaining of this number. Other timely articles appear, such as The Economic Consequences of the Liberation of Cuba, and The Labor Crises and Other Periods in the United States.

Asphaltum. This is the name of a pamphlet just issued by The Armitage Manufacturing Co., Richmond, Va., which is engaged in the manufacture of building papers, two and three ply, asphalt ready roofing tarred felts. This pamphlet is interestingly illustrated, and well worth perusal, aside from its advertising features. We would suggest writing to this company for a copy of it.

Appleton's Popular Science Monthly, for September. New York. D. Appleton & Co. $5. a year. This number contains a sketch of Chas. Goodyear, the discoverer of the vulcanization process in connection with the rubber industry. The series of articles on "The Evolution of Colonies," is continued, though for coherency of ideas, it has, in our opinion, but little merit. Prof. C. H. Henderson continues his series of articles on "The Philosophy of Manual Training." This series is well worth the subscription price of the magazine. The higher education of women is well told in an article on "College Women and the New Science." The leading article in the magazine is on "The Geological Waterways Across Central America," by J. W. Spencer. This subject is of especial interest at this time.

The Lowell Textile School. This is a catalogue of 87 pages, issued for the 1898-9 sessions of the Lowell Textile School, Lowell, Mass., of which Wm. W. Crosby is principal. The list of trustees of this school is a sufficient guarantee of its value to students and to the textile manufacturing industry in general. The 1898-9 year begins October 3, the entrance examinations commencing September 22. We would advise those interested in textile education to write to the principal for a copy of this catalogue. It is something that should be in the hands of all those interested in the textile industry.

Woolen Machinery and Turbine Water Wheels. The Rodney Hunt Machine Co., Orange, Mass., have just issued a catalogue relating to their specialties,—turbine water wheels and woolen machinery. The catalogue is highly illustrated, and appears as its thirteenth edition. Aside from its being a trade catalogue, it furnishes a great deal of valuable information that all users of water wheels and woolen machinery should know.

Milling Fast Chrome Colors. This is the title of a bulletin issued by William J. Matheson & Co., New York, showing dyeings of milling fast chrome colors, which are fast to light and milling, being quite equal, if not superior, in these respects, to those produced with cochineal and flavine; and, on account of their level dyeing properties, they are especially valuable for the dyeing of woolen and worsted yarns and for pieces, where fastness to light and milling and brilliancy of shades are considerations.

Industrial News.

—The American Correspondence School of Textiles will commence instruction for the fall term early in October, and arrangements have been made for giving complete technical instruction by mail in cotton picking, carding, warp preparation and weaving; also in the weaving and designing of all fabrics. Subsequently at an early date classes will be opened in woolen and worsted yarn and cloth manufacturing, and in dyeing of all fibres. The opportunity thus given for a thorough course in textile instruction will be invaluable to all mill men who aspire to higher positions of any kind in a mill. Printed matter, explaining these courses can be had by addressing Director C. P. Brooks, Lowell, Mass.

—The Virginia Cotton Mills, Swepsonville, N. C. have lately purchased a 2,500 lb. "Cyclone" Automatic Cotton Stock Dryer, with self feed, from the Philadelphia Textile Machinery Company, after having carefully examined into the respective merits of the various machines for this purpose now on the market. As this machine was built in six days it is conclusive proof that the manufacturers know their business and are fully up to date in their equipment for this class of work.

—After spending some time in carefully looking over some of the most prominent Eastern plants J. Burton and Company, of Chicago, Ill., have placed an order with the Philadelphia Textile Machinery Company for one of their Proctor Improved Single Fancy Garnett Machines, on condition that it be shipped from Philadelphia in eight days.

—Sig. Otto Degetau, Monclova, Mexico, is installing only the very latest and best machinery in his new cotton mill at that place. Philadelphia manufacturers came in for their full share of orders for this

plant and the Automatic Cotton Stock Dryer purchased from the Phila. Textile Machinery Company is sure to uphold the reputation of this concern for building the best machinery on the market for this purpose. George F. Dyer, of D. H. Dyer & Son, Fall River, Mass., is superintending the installation of this plant.

—An ordinance was recently passed by the city of Atlanta, Ga., pledging the payment of $3,000 to the Georgia School of Technology for the benefit of the textile department. The sum was recently promised the school as a gift to meet the conditions imposed by Mr. French, the Pittsburg manufacturer who agreed to donate $2,500 for the school if the city would give $3,000. The money will be paid before December 31, next.

—The Amoskeag Mfg. Co., Manchester, N. H., makes a very good showing in its August dividend of four per cent., bringing the year's dividend for 1898 up to six per cent. This is a better exhibition than last year, when five per cent. was declared for the year. The amounts which this company has paid in dividends for the last eight years, aggregate $2,360,000. The largest amount paid in one year in dividends, was in 1891-2, and the smallest amount in 1894, when there was but one dividend declared, that of four per cent. in June.

—Wm. Breedon, ex-mayor of Amsterdam, N. Y., senior member of the firm of Wm. Breedon & Son, manufacturers of spring knitting needles, died suddenly, August 15, at the age of seventy years. He was a native of Leicestershire, England, and came to America in 1851.

—The Berlin Iron Bridge Co., East Berlin, Conn., are furnishing the structural steel work for the N. E. Sanitary Product Company's new building, that they are erecting at Old Harbor Point, Mass. The building is of skeleton steel framework, consisting of steel columns built in the walls, carrying heavy steel floor beams and girders, and clear span roof trusses which support the roof. The East Berlin Company have also received the contract for the steel work of the new mill of the Fall River Bleachery, at Fall River, Mass. This building is to be 65 feet wide and 200 feet long, with side walls of stone, the supporting framework being made of steel. The contract for furnishing and erecting the fire proof buildings now being put up by the Guggenheim Smelting Co., Perth Amboy, N. J., has been awarded to the East Berlin Company.

—A correspondent of the Textile World in the South writes that a number of the mills of that section, especially in the Carolinas, are working up a very desirable class of foreign trade, direct with Japanese and Chinese houses. He knows of two or three Carolina mills which have sold every yard of their products to these firms, representing six months' continuous operations in several instances, the goods being ordered beforehand and an entire train load, of twenty or more box cars, being shipped at one time by two of the mills. Southern manufacturers say that they are depending largely on the development and growth of this direct foreign trade (the goods mentioned were shipped from Charleston, a deep water port almost in sight of one of the mills) for future business; that the Southern mills can successfully compete with the world in the sale of a large class of cotton goods, and some of the mill firms have sent representatives and "drummers" to Japan, China and elsewhere already. The opening of new ports, new markets and a large increased sale of American manufactured cotton goods is expected to be one of the early results of the war just ended.

—The Vermont Spool & Bobbin Co., who do a large business in spools, bobbins, beams, reels, tubes, etc., have purchased of the estate of the late Horatio Hickok, the packing box and cloth board business long and favorably known under the name of Horatio Hickok & Co., of Burlington, Vt., and will add that line to their own. C. D. Ordway, president of the company, is an active worker and is constantly among the mills in which trade he has a large and ever increasing patronage. This company makes a fine line of goods, and as Mr. Ordway keeps personally in touch with the trade he knows just what his customers want and gives it to them.

—Mr. Max Jagerhuber, president and treasurer of the Textile America Publishing Co., and at one time part owner of the Dry Goods Economist, has been elected a director of the Mechanics & Traders' Bank, one of the oldest State banks in New York. Mr. Jagerhuber has been identified with the business world for the past twenty-five years, and is well known in business circles, not only in New York, but in many other of the cities of this country, as well as in Europe.

—Edward Jefferson & Bro., 28 Strawberry St., Philadelphia, have recently issued a new catalogue of second hand cotton, woolen and worsted machinery which they offer for sale. The machinery includes complete plants as follows: worsted spinning mill; Clay worsted plant; men's wear plant; fancy curtain plant; Brussels carpet plant, consisting of 112 looms and accessary machinery. The catalogue gives an itemized list of the machines, as well as an index of the supplies which they carry on hand. Besides their general machinery agency, the firm is sole American agent for J. B. Farrar & Sons' worsted machinery, Brigella cork rollers and Philadelphia agents for Geo. S. Harwood & Son, carrying a complete outfit of parts of their machinery. They invite manufacturers, who may have machinery which they wish to dispose of, to send them a list and get their quotations for cash prices.

Paxton & O'Neill.

We were recently favored with a call at our Boston office from Mr. J. B. Paxton, of the firm of Paxton & O'Neill, the well known knitting machinery builders of Philadelphia. While Mr. Paxton called his little trip a vacation, yet he found time to call upon those with whom he is doing business.

In spite of the dull times in the past few months, Paxton & O'Neill have been busy and had all the work they could comfortably do right along, with the exception of the months of June and July, when business slacked up a little and they worked only five days a week. The first of August found them with orders to warrant going back on full time and they now have a great deal of work in

prospect. Mr. Paxton tells us that a very large part of their business is in re-orders from their old customers. They have made it a fundamental principle, ever since they started in business, to send out no machine but what was as good as they could make it, and the result has been that the repair bills of their machinery have been rediculously small, and the quality of the work produced of high standard. Starting at first as manufacturers of wrought steel cylinders and dials for all kinds of machines, they built up a large business and established a reputation which gave them an easy entree when they enlarged their field by the addition of their half and three-quarter automatic attachments to seamless knitters, and later to furnishing complete machines. Their business in this direction has shown a very gratifying and constant increase and they seldom lose a customer who has once introduced their machines.

The Coming Mechanics' Fair.

Structural and Decorative Improvements of Interest to Exhibitors and Visitors.

The spirit of progress which has characterized the executive committee having in charge the 20th triennial exhibition to be held in Boston, of the time-honored Massachusetts Charitable Mechanic Association is again strikingly apparent in several important directions. Not only have the character and scope of the exhibits themselves been elevated and broadened, but the building, with its immense floor area and exhibition resources, has been remodelled and greatly improved.

Latest reports from the several departments point conclusively to the most interesting exhibition in the history of the association, rendered doubly so by the timely and up-to-date competitive exhibits covering the most recent scientific and utilitarian discoveries and developments, and presenting to the world, for the first time in history, a great fair entirely driven by electricity as a motive power.

Applications for space continue to pour in, and the managers find themselves confronted by the necessity of selecting only those of the greatest public interest. This means that intending exhibitors should lose no time in inspecting the floor plans and filing early applications if they hope to be represented in the Mechanics' Fair of 1898, which opens Oct. 10.

New England Cotton Manufacturers' Association.

The sixty-fifth meeting of the New England Cotton Manufacturers' Association will be held at the Crawford House, White Mountains, beginning Tuesday evening, September 27th, with an address by the president, Stephen A. Knight, of Providence, and followed by one paper, after which the remainder of the evening will be devoted in an informal and social manner.

On the two following days the sessions will be held in the morning and evening, leaving the afternoon free for members and their guests, including ladies, to visit the numerous places of interest in the vicinity.

The programme will not be issued until shortly before the meeting.

The board of government have placed the arrangements for transportation in the hands of Raymond and Whitcomb, tourist agents, 196 Washington Street, Boston. Special Pullman cars will take the party from the Union Station, Boston, at 9.30 Tuesday morning, September 27th, and stopping at Lowell, Manchester, Concord and other stations, where the party will be re-enforced by members living on the route, and stopping at the Pemigewassett House, Plymouth, N. H. for dinner, reaching the Crawford House, at 5.30 p. m.

The return trip leaving the Crawford House at 9.30 Friday morning will reach Boston by way of Eastern Railroad at 3.30 p. m. Those wishing to go directly to Lawrence or Lowell may leave the train at Rochester, N. H. The cost of the trip will be $17.

Managers of mills and others interested in the cotton manufacture can obtain full particulars in regard to joining the association by addressing the New England Cotton Manufacturers' Association, Boston, Mass.

New Thread Combination.

ORGANIZATION NEARLY COMPLETED. FEATURES OF THE PLAN.

Arrangements are rapidly being completed for the organization of the American Thread Company, which was incorporated last March at Trenton, N. J. The company has a capital of $18,000,000. It was expected that a prospectus would be issued in August, in London, and also in this country, but there has been some delay.

The main features of the new company have already been explained. It will include practically every leading cotton thread company in this country. The Willimantic Linen Company, the Warren Thread Company, the Merrick Thread Company, the Kerr Thread Company, and the William Clark Company and Alexander King & Co. are among the largest of these. The company's capital of $18,000,000 is divided into $6,000,000 of four per cent. debenture bonds, $6,000,000 of six per cent. preference stock and $6,000,000 in ordinary shares. In London it is reported that the American manufacturers will take $8,000,000 of the stock in part payments for their business.

Some difficulty was experienced in inducing the various companies to agree to the consolidation, especially with the Willimantic Company. This was finally overcome, however, through the purchase of the Willimantic by the English Sewing Company, which will have a very large if not controlling interest in the American Thread Company. The English Thread Company is itself a consolidation of the cotton thread companies of Great Britain not included in the great Coats trust. The Coats Company, however, holds a large though not controlling share of the stock of the English Sewing Company. It would therefore seem fairly certain that the recent severe competition in the thread trade will shortly be done away with.

The completion of the new American company has already been anticipated by an advance of from 15 to 20 per cent in three-cord goods and long lengths of six-cord goods in which the competition was most keen.

As soon as the prospectus is issued steps will probably be taken to complete the organization by the election of officers, and it is understood that the new company may be in operation by October.

Recent Sales of Mill Shares.

	Lowest.	Highest.
Border City	101	101
Mechanics	65	65
Flint Mills	90	90
Globe	65	65
Amory	119½	120¼
Manchester	98¼	98¾
Naumkeag	46	48¾
Lancaster	307½	307½
Continental	15	15
Franklin	97¾	100
Great Falls	150⅛	151¼
Sagamore	85	85
Weetamoe	35	40
Lyman	51¼	55¼
Nashua	487½	487½
Jackson	927½	927½
Assabet	79¾	90
Lowell	500	502
Cocheco	175	175
Massachusetts (Ga.)	110½	110¾
Lawrence	103	103
Hamilton	622½	625
Amoskeag	1356¼	1360
Massachusetts (Mass.)	77¾	77¾
Barnard	70	70
Granite	70	70

Carders' Convention.

The Amalgamated Carders of New England, held a convention in New Bedford., August 7. Delegates representing the following places were present: Fall River, Ashton, Lonsdale, Berkley, and New Bedford. The principal business of the convention was the question of meeting in some more central city, whereby all the unions would be able to send delegates and not have so far to travel. This idea received general favor, and it was decided to meet in Boston hereafter.

MILL NEWS.

Cotton.

New Mills.

*Georgia, Columbus. Referring to the new mill to be built by the Columbus Mfg. Co., Mr. F. B. Gordon, sec., committee in charge, informs us that the organization will not be effected until the capital stock is raised.

This company will be organized with a capital stock of $100,000. Among those interested are F. B. Gordon, W. C. Bradley, E. N. Clemence and others. Mr. Clemence was formerly the treasurer of the Eagle and Phenix Mfg. Co. The plans contemplate a 10,000 spindle yarn mill. Although the capital will be only $100,000 at first, it will eventually be raised to $200,000, and possibly weaving will be put in later. The project seems to be favorably received by business men and is likely to materialize. J. A. Kirven is chairman and F. B. Gordon secretary of the committe in charge. Over $50,000 has been already subscribed.

—*New York, New York Mills. Last May it was reported that New York Mills contemplated establishing a plant in the South near Rome, Ga., but the war with Spain caused the matter to be dropped temporarily. It is probable that a decision will be arrived at early next year.

—*North Carolina, Edenton. The Edenton Cotton Mills Co. has been incorporated with a capital stock of $80,000 by W. D. Pruden, J. A. Williams, C. G. Vann, and others. The plans are for a 5,000 spindle mill with looms.

—*North Carolina, Edenton. Work on the mill of the Edenton Cotton Mills Co., recently incorporated with a capital of $80,000. (authorized capital $500,000) will probably be started at once. The equipment at first will be 5,000 spindles and it is expected that this will be increased from time to time. Frank Wood is president, H. C. Privott, Treasurer.

—*North Carolina, New Berne. James M. Harrison informs us that he has not yet taken any definite steps towards the establishment of his yarn and twine mill. He says he is contemplating so doing.

—*Pennsylvania, Philadelphia. Rudolph Blankenburg & Co., who purchased the Wallace Mills last April, as reported, is about to fit them up for manufacture of comfortables and bindings. The firm are large importers and dry goods jobbers.

—*South Carolina, Fountain Inn. The 6000 spindle yarn mill of the Fountain Inn Mfg. Co., details of which were reported in March and April, has its buildings well under way. One of the officers of the company was recently in the North purchasing machinery and it is hoped to get the plant in operation in the autumn. P. C. Poag is the secretary and treasurer.

—*South Carolina, Lando. The Manetta Cotton Mills, of which B. D. Heath of Charlotte, N. C., is president, which were burned recently, will probably be rebuilt. It was formerly a 5,000 spindle mill making warp yarn 8's to 20's.

—*South Carolina, Laurens. There have been a number of rumors concerning a new yarn mill project at this place, with which the names of W. W. Ball and Dr. Irby have been connectd. Mr. Ball informs us that as far as he is concerned the story is without any foundation.

—*Tennessee, Chattanooga. We have further information in regard to Vance & Kirby Mfg. Co.'s mill. Product will be hosiery yarns, having 12 revolving flat cards, 5,000 spindles, steam power. They expect to begin production in the fall. This mill will be operated by a company with the above name.

—*Virginia, Danville. Referring to the mill of which G. C. Baldwin is the pro-

jector, we have further information from Mr. Baldwin in regard to his plans. The mill will probably be located in Richmond Co., N. C. It will have 2,000 spindles to make single and 2-ply warps and yarns. A new building will be erected and it is expected to begin production in the summer of 1899. Complete equipment will be required, also power and transmission machinery.

Enlargements and Improvements.

—*Georgia, Dalton. $90,000 will be spent for new machinery to be put in the addition now being built by the Crown Mills, details of which were reported in June. Enlargement will consist of 10,000 spindles and 250 looms, and will about double the capacity.

—*Georgia, Lindale. The Massachusetts Mills in Georgia confirm the report that an addition will be built to their present plant to contain about 20,000 spindles, giving them a total of 50,000 spindles. The mill makes export sheetings. Chas. L. Lovering, 843 Exchange Bldg., Boston, is treasurer.

—*North Carolina, Monroe. The Monroe Cotton Mills deny the report that they are to double their capacity or to build an addition.

—*South Carolina, Columbia. The contemplated enlargement of the Granby Cotton Mills will probably be made in the near future. The plant was originally planned for 50,000 spindles and 1,000 looms and now contains about 18,000 spindles and 500 looms. The capital stock will be largely increased. Electric power is used. W. B. Smith Whaley, of Columbia, is the president of this company and will have charge of the new work.

—*South Carolina, Rocky Hill. The Standard Cotton Mills were sold Aug. 23rd to the Highland Park Manufacturing Co., Charlotte, N. C., for $50,000. This was at foreclosure sale, at which upset price was placed at $30,000. The mills have 450 looms, but new owners say that they will immediately add spinning equipment of about 10,000 spindles and other machinery, which will be bought immediately.

—*South Carolina, Yorkville. It is likely that the No. 2 mill of the Yorkville Mfg. Co., details of which were reported in March, will be undertaken very soon giving additional equipment of 2500 spindles and 1200 twisters. John R. Ashe is the treasurer and general manager.

—*Virginia, Lynchburg. It is likely that the new mill to be built by the Lynchburg Cotton Mill Co. will be undertaken soon. As we reported in April, it is the intention to increase from 21,000 spindles to 40,000 spindles and from 725 looms to about 1400. Max Gugenheimer is president of the company. C. R. Makepeace & Co., of Providence, are drawing the plans.

Mills Starting Up.

—Louisiana, Washington. The Henrietta Cotton Mills, Jacobs & Russell, proprietors, which have been shut down for two years, are to be started up. This is a 3,000 spindle yarn mill.

—Louisiana, Washington. John L. Schroeder has leased and started up the Henrietta Cotton mills from Jacobs & Russell, the proprietors. This is a yarn mill of 3,000 spindles and has been shut down for two years.

Mills Shutting Down.

—*Massachusetts, Fall River. Although no agreement has been effected for concerted action in regard to shutdown, several mills will doubtless close for varying terms during the next two months. The Chace mills posted notice Aug. 19th of two weeks' shutdown; also Stafford and Wampanoag. This represents 250,000 spindles and it is probable that other mills will close.

Woolen.

New Mills.

—*Illinois, Chicago. Armour & Co. inform us in reference to their felt mill that they will manufacture felt boots as well as piano, insulating and tailoring felt. The new factory is one of the most complete of its kind in this country. H. P. Darlington is the manager.

—*Maine, Corinna. We learn that Chas. A. Greenwood's new mill will not be double the capacity of the old one, but will be the same size; viz., 3 sets. The main building will be 80x45, and the picker and boiler houses will be separate brick structures. Work is being pushed vigorously and it is hoped to start up some time in October.

—*Maine, Old Town. The new mill of the Ounegan Woolen Company has not yet been started, the company not yet having settled upon the size of the mill. It is expected that this point will be decided in a few weeks and work will then be rushed as speedily as possible.

—*Maine, Phillips. We understand that the Phillips Woolen Co., which was organized to rebuild the Hescock & Atwood Mill, has given up the project and Messrs. Hescock & Atwood will rebuild the mill on their own account and have already started to do so.

—*New Jersey, Hightstown. Machinery for the new rug factory which will be operated by J. C. Cook and Co., formerly of Janvier, is arriving and the plant will soon be started up. They have incorporated as the Hightstown Smyrna Rug Co., with a capital stock of $50,000.

—*New York, Amsterdam. The new Amsterdam Woolen Co. will make a line of cloth and felt goods somewhat similar to H. Waterbury & Sons at Oriskany. This latter firm is largely interested in the enterprise. J. T. Hepworth, an Englishman experienced in this line of goods, will be the manager of the plant.

Enlargements and Improvements.

—*Maine, Dexter. The building for the new mill of Amos Abbott & Co. is about completed and the work of installing machinery will soon be begun. The increase in machinery will necessitate running the engine in connection with the water power.

—*New York, Fulton. Work on the addition to the Fulton Worsted Mills is being pushed vigorously and the building will soon be ready for machinery.

—*New York, Fulton. Concerning the new building which is being built by the Fulton worsted mills, of which Chas. Fletcher is proprietor, we find that this building is being erected merely to give them more room for the machinery they already have, as the present buildings are over crowded.

—*Ohio, Pandora. Amstutz, Welty & Co. confirm our recent report that they are to move machinery of the Columbus Grove (Ohio) woolen mill to this place and inform us that they will use steam power to operate one set of cards and two looms. They will probably start up early in September. They may add some looms and knitting machines next year, if successful.

—*Pennsylvania, Coudersport. The Northern Woolen Mfg. Co., recently incorporated to succeed C. J. Marble & Sons, inform us that their reported enlargement will not be made just at present.

Mills Starting Up.

—Connecticut, Mechanicsville. The French River Textile Co., formerly the Mechanicsville Mill, last month received a big army contract and are starting up more machinery.

—*Illinois, Lanark. William Whitfield & Sons, confirm our report that they had purchased the Lanark mills, and say that they will start up at once, making blankets, flannels and yarns.

—Maine, Dover. The Brown Mfg. Co. has started up on full time and is running all its machinery on kerseys and flannels.

—Maine, Fairfield. The Kennebec Worsted Co., which has been shut down since May, is starting up again.

—Maine, Madison. Both the mills at this place have started up and are running full time. The Madison Mill has a large government order.

—Maine, North Vassalboro. The Vassalboro Woolen Co. has resumed operations after a shutdown of two weeks for repairs. At the annual meeting recently held directors were re-elected.

—Maine, Pittsfield. The Waverly Woolen Mills and the other Dobson mills are starting up with orders ahead.

—Massachusetts, Collinsville. The Collinsville Mill is starting up all of its machinery that is available on the class of work for which they have large orders; viz., low grade kerseys.

—Massachusetts, Cordaville. The Cordaville woolen mills, which have not been running up to full time recently, have now resumed operations in full.

—Massachusetts, Dalton. The Hampden Woolen Co., which has been shut down since May, has started up again.

—Massachusetts, Fitchburg. The Fitchburg Worsted Co. is now running its mill on full time. Their plant has been running on short time for three months.

Mills Shutting Down.

—Maine, Warren. The Georges River Mill was shut down for an indefinite period.

—Massachusetts, Auburn. The Stoneville Worsted Co. has closed down for the present until business improves.

—Missouri, Carthage. The Carthage Woolen Mills are closed down for a few weeks, during which time necessary repairs and improvements will be made.

Knit.

New Mills.

—*Michigan, Detroit. The new mill to be established by Friedman, Forrester & Co. will occupy a new building. The product will be ladies', misses', infants', men's, and boys' mittens, gloves and hosiery; steam power; 175 new machines; employing 200; expect to begin production about Jan. 1st, 1899. The mill is at 40-46 Champlain St. They will sell direct.

—*New York, Arcade. The brick building to be occupied by the Fashion Knitting Mill of John C. Sanford is rapidly nearing completion. This building is 58x80, 4 stories, brick.

—New York, Stockport. It is reported that L. J. Rossman, proprietor of the Rossman Knitting Co., has purchased a mill which has been idle here and will establish a new knitting plant.

—*North Carolina, Gibson. The Standard Knitting Mills, which were burned in July, will probably be rebuilt at once on a larger scale.

—*Ohio, Dresden. The hosiery mill of Kapner Bros. and Duga Hosiery Co., which was burned in April, will be rebuilt on a larger scale. The old mill contained 3 sets of cards and 50 knitting machines.

—*Pennsylvania, Tower City. D. A. Boyer informs us that he is about to start a new plant to manufacture ladies' fast black hose. He will use a gasolene engine and start with 5 machines. It will be an entirely new enterprise, and he needs a complete outfit.

—*Pennsylvania, Nanticoke. The new Diamond Knitting Mills have started up. They manufacture hosiery and have a capacity of 600 dozen per day. Geo. West is the manager.

Enlargements and Improvements.

—*Georgia, Barnesville. The Oxford Knitting Mills, which started up about June 1st with 20 machines on high grade cotton underwear, will be enlarged at once. A new brick building, 30x50, will be completed about the first of September and new machinery put in, which will largely increase its capacity. Full particulars of this enterprise were given in April.

—*Georgia, Barnesville. In further reference to the addition to Hanson, Crawley & Co.'s mill, we are informed that the product will be Swiss ribbed underwear made of single and double lisle thread. The mill now has 16 machines, but will put in 30 more, which will give employment to about 125 more operatives. They hope to begin production in the new part, about Sept. 1st. This building will be 50x50, brick.

—*Georgia, Marrietta. The Marrietta Knitting Co., which recently increased its capital from $7500 to $18,000 and put in 25 new machines, are now talking of raising it to $25,000, and expending the increased capital in more machinery. Their product is 175 needle half-hose.

—*New York, Cohoes. Work on the new Victor Knitting Mill is being pushed vigorously.

—Pennsylvania, Philadelphia. The Victoria Knitting Mills, 1916 North 4th St.,

Querns Bros., proprietors, are adding a fifth story to their mill and also building an addition 50x90 to accommodate their increasing business.

—*Pennsylvania, Philadelphia. Querns Bros., proprietors Victoria knitting mills, 1914-1930 North 4th St., confirm our recent report that they are adding a fifth story to their building and also putting an addition 50x90.

—*Vermont, Bennington. The knitting mill of H. E. Bradford & Co. is undergoing extensive repairs, which were commenced several weeks ago. A new engine house is being built and a new 175 h. p. Corliss engine put in and a pair of horizontal water wheels added. Six sets of 48-in. Davis & Furber mules will replace four sets of 40-in. mules.

Mills Starting Up

—Connecticut, Waterville. The mills of the H. L. Welsh Hosiery Co. have started up in full.

—Massachusetts, Farley. The Orange Knitting Co. has started up after a shutdown of several weeks.

—Massachusetts, Methuen. The Knitted Fabrics Co., which has been shut down for a few weeks, has started up again.

—*Minnesota, Mankato. Re-organization of the knitting mills here will be known as the Mankato Mills Co. W. L. Hixon has half interest and will take an active interest. The new machinery, which it has desired to add for some years, will probably be put in soon, and the plant operated at its full capacity on hosiery, gloves and mittens.

Silk.

New Mills.

—*Pennsylvania, Easton. The project for a new silk mill for R. & H. Simon, of Paterson, which was suspended on account of war, is now an assured fact and the amount necessary to build the building has been over subscribed by local investors. Contract for building the new mill has been let. It is expected to be ready about Jan 1st and will give employment to 250 hands. Its product will be silk ribbons.

—*Pennsylvania, Parsons. The new mill for the Parsons Silk Throwing Co., of which W. J. Hartman is manager, is expected to begin operations in October. Foundations are finished. There will be a separate building for the engine and boiler house.

—*Pennsylvania, Phoenixville. Johnson, Cowdin & Co., silk manufacturers at Paterson, N. J., who are building a large mill at this place, have rented a building here, which they will equip as a silk weaving school where operatives will be instructed in various processes under the management of David Schumttz, now superintendent at the company's mills at Paterson.

—*Pennsylvania, Wilkesbarre. The new mill for the Bamford Bros. Mfg. Co., is well under way. It will be equipped with all modern improvements, and the mill is expected to start up about the first of January. J. W. Ferguson of Paterson, is the engineer in charge.

—*Pennsylvania, Williamsport. Work on the Lycoming Silk Mills has been somewhat delayed, but it will probably go forward now. M. B. Ritter, mill engineer, has prepared plans for the main building, which will be of brick, 4 stories 200x45.

Enlargements and Improvements.

—Pennsylvania, Ephrata. Westerhoff Bros. & Napier have bought the silk machinery of Sauquoit Silk mill at Sauquoit, N. Y., which has been idle since 1894. This machinery will be set up in the basement of their new silk mill here.

Miscellaneous.

New Mills.

—*New Jersey, Lodi. Lockwood Greene & Co., of Boston, are the mill engineers of the new Silk Finishing Works, which will be erected on the site of the Bryne's Print Works, destroyed by fire some years ago. The contract has been awarded to John W. Ferguson of Paterson. The plant will cost about $100,000.

Enlargements and Improvements.

—Illinois, Peoria. The Peoria Cordage Co. will put up a new store house 42x150, 3 stories, and a new machine shop 32x40, 3 stories.

—Massachusetts, Unionville. Geo. R. Whiting is rebuilding his extracting plant and will put in latest improved machinery, and expects to be ready to start before long. His mill was damaged by fire Aug. 9th.

Mills Starting Up.

—Pennsylvania, Philadelphia. The Amber Silk Dye Works, Amber St. and Allegheney Ave., Chas. Technor & Co., proprietors, have started up their new works which were previously reported in June.

—*Pennsylvania, Philadelphia. The Philadelphia Linen Co., who were burned out at America and Diamond Sts., on July 10, 1898, have moved the plant to Bristol St., Nicetown. They expect to start up Oct. 1st, and are not putting in any additional machinery, as was reported last week. Their product is linen yarns in hank, spool or cop and they may make linen twines of all kinds.

Fires.

—Massachusetts, South Milford. The Whiting Shoddy mill at this place was damaged by fire to the extent of about $1500, which was covered by insurance. The necessary repairs will be made at once.

—Massachusetts, Webster. The H. N. Slater Cotton Mill at North Webster was struck by lightning and some damage done in the card room, also to cloth. No interruption in work was caused, and damage was fully covered by insurance.

Failures and Suspensions.

—New York, Brooklyn. A. Rossman & Co., Kings County Knitting Mills, manufacturers of Swiss ribbed underwear, have made an assignment on Isaac Lubling.

Facts and Gossip.

—Connecticut, New London. It is understood that the Brainerd & Armstrong Co., silk manufacturers, will increase their capital stock from $140,000 to $300,000.

—•Massachusetts, Holyoke. Alexander McCallum of the McCallum Hosiery Co., Northampton, has bought the Constable hosiery mill here, of which he formerly owned half interest. It is understood that he will move the plant to Northampton. This will necessitate a large addition to his present plant, which is a part of Belding Bros. silk mill.

—•Massachusetts, New Bedford. At the stockholders' meeting of the Whitman Mills, Aug 25th, it was decided not to build a new mill. It was determined, however, to reduce the capital stock to $50,000, and then put in $500,000 new capital, making total of $550,000. The mill will be operated with its present equipment to see if it can be made to pay.

—•Minnesota, St. Paul Park. The deed of sale of the plant of the Northwestern Cordage Co. to the Minnesota Grass Twine Co. has been recorded. The property includes 10 acres of land, grounds and buildings. The consideration is $102,500. There are two mortgages on the property, one for $125,000 to the St. Paul Title & Trust Co., of which $76,000 is due and unpaid, and one for $9,000 to Sally F. Rogers, of which $2,500 is unpaid. The purchasers assumed payment of the mortgages. This sale was reported last May.

—•New York, Dolgeville. The sale of the machinery and a quantity of wool and felt of Alfred Dolge & Son took place Aug. 18th. The machinery was listed at $64,000 and was sold to S. R. Ingham of St. Johnsville for $19,000. Furniture, tools, felt and material listed at $69,799 were sold to Mr. Ingham for $30,271. Miscellaneous articles brought $10,000. Mr. Ingham represented Edward Burns of American Exchange National Bank of New York. Several prominent wool dealers were present.

—•New York, Poughkeepsie. The Board of Trade has failed to interest local parties in organizing a company with $18,000 capital stock to operate the Wynhepo silk mills, as per recent offer of Edwin S. Brown, the owner, and it is now certain that the plant will be removed to Hornellsville, N. Y.

—•New York. Schaghticoke. Judgments were entered Aug. 19th in New York City for $20,143 against the Schaghticoke Woolen Co., Stephen W. Barker of Troy, by Stearn & Rushmore in favor of the New York Life Insurance & Trust Co. on notes of the company endorsed by Mr. Barker in favor of the Bank of America for $15,235, and in favor of the National Bank of Commerce for $10,434 as endorsed by notes of the Schaghticoke Woolen Co.

PERSONAL RECORD.

Cotton.

—H. S. Andrews, formerly carder at the Harmony Mills, Cohoes, N. Y., has accepted a similar position with the Queen City Mills, Burlington, Vt.

—Joseph Austin, boss carder of the Oak Mills, Louisville, Ky., has returned to his home in Olneyville, R. I.

—James Barnes has resigned his position as loom fixer in the Atlantic Mills, Olneyville, R. I., and has gone to England.

—B. J. Blackwell, of Cordele, Ga., is now second-hand at the Columbia (Ala.) Cotton Mills.

—P. N. Brassars, formerly second-hand of carding at the Queen City Mills, Cohoes, N. Y., is now at the Colchester Mills, Winooski, Vermont.

—James E. Briggs has resigned his position as boss weaver and designer at the Pequot Mills, Montville, Conn.

—Dr. A. G. Brower has been elected president of the Steam Cotton Mills Co., Utica, N. Y., vice R. R. Williams, resigned.

—Oscar Bugenit, formerly loom fixer at the Knoxville (Tenn.) Mill, has accepted a similar position at the Berkshire Mills, Adams, Mass.

—R. H. Chadwick has resigned his position as foreman of the cloth room of the mill in Galveston, Tex., and has accepted a similar position in a mill in Langley, S. C.

—J. A. Clark, Jr., is in charge of the spinning at the Globe Mills, Augusta, Ga.

—D. E. Clough has been appointed general superintendent of the carding and spinning of the Fairmount Cotton Mills, Fairmount, S. C.

—W. J. Colbert has resigned his position in the Slade Mill weave room, Fall River, Mass., and has gone to the Slater Manufacturing Co., Webster, Mass.

—Archie Cooper has accepted a position as boss carder in the cotton mills at Manchaug, Mass.

—Edw. Cole has accepted the position of superintendent of the cotton mill at Ramseur, N. C., rendered vacant by the resignation of Mr. Hurley.

—Jefferson D. Cole is now in charge of looms at the Roanoke Mill at Roanoke Rapids, N. C.

—"Bud" Councilman, of Durham, N. C., has been appointed superintendent of weaving in the mill at Ossipee, N. C.

—R. Cowell, formerly of the Grinnell Mills, New Bedford, Mass., has been ap-

pointed to the position of overseer of weaving of the Warwick Cotton Mills, Centreville, R. I., rendered vacant by the resignation of George Fish.

—S. L. Cutting has accepted the position of superintendent in the Avondale Mills, Burlington, Ala.

—John A. Davis is the new superintendent of the cloth department of the Cawthorn Mills, Selma, Ala.

—L. W. Dexter is now in charge of spinning room of the Atlantic Mills, Lawrence, Mass.

—W. B. Dillingham has resigned his position as shipping clerk and overseer of the finishing department of the Mascoma Flannel Co., Lebanon, N. H., and accepted a position as assistant manager in a Georgia Cotton mill.

—W. H. Dutton, Darby, Pa., has been appointed overseer of the twisting machinery at Verlendon's mill.

—James E. Dynes has accepted a position as second-hand of weaving at the Davol Mills, Fall River, Mass., in place of Benjamin Foster, resigned.

—Ariel Edwards has resigned his position with the Social Manufacturing Co., Woonsocket, R. I.

—F. W. Farrell has been engaged as superintendent of carding with the Blue Springs Mill at Selma, Ala.

—A. A. Freeman has resigned his position as superintendent of carding at the mill at Rocky Mount, N. C.

—B. H. Filley is now overseer of spinning at the Pee Dee Mill, Rockingham, N. C.

—George Fish, formerly overseer of weaving at the Warwick Cotton Mills, Centreville, R. I., has resigned to take a similar position in No. 1 mill of the Massachusetts Corporation, Lowell, Mass.

—Napoleon Fisher was presented with a gold watch by the employees under his charge on the occasion of his leaving the Shove Mill No. 1, at Fall River, Mass.

—M. M. Fitts has been appointed second-hand of the Cottondale Mills, Cottondale, Ala.

—John Fleming, formerly of Manchester, N. H., is now second-hand of ring spinning, at the Queen City Cotton Mill, Burlington, Vermont.

—W. A. Foster, formerly overseer of carding at Pacolet, S. C., is now filling a similar position at the Avondale (Ala.) mills.

—Lewis Guion has been appointed to the superintendency of the new mill in course of erection at Norwood, N. C.

—Wm. H. Harper is the new overseer at the Pepperton Cotton Mfg. Co's mill at Jackson, Ga.

—Robert R. Harvey has accepted the position of assistant superintendent at the Wyoming Valley Lace Mills, Wilkes Barre, Pa.

—A. S. Haskel, Jr., is now engaged as superintendent of the Enoree Mill, Jonesboro, N. C.

—W. T. Henley, formerly superintendent of the Columbia mill at Ramseur, N. C., has accepted a similar position with the Smitherman mill at Troy. Mr. Henley succeeds F. Page, who was incapacitated from work by an injury received some time ago.

—T. M. Holiman, formerly superinten- Manufacturing Co., has assumed a simident at No. 2 mill at the Langley (S.C.) lar posititon with the W. J. Hooper Manufacturing Co., Mountain Island, N. C.

—J. H. Hurt, overseer of The Gaston Cotton Mills, Cherryville, N. C., has taken a temporary position at the new Nantucket Mills, Spray, N. C., while his 96 looms are idle at Cherryville.

—Jesse A. Knight, formerly superintendent of the Harris Textile Co., Harris, R. I., has removed to Olneyville, R. I.

—C. J. Maguire has resigned his position as superintendent of the Selma, (Ala.) Cotton Mill and has removed to Birmingham, Ala.

—Frank McCauley has returned to his old position as overseer of the dresser in the mill at East Greenwich, R. I.

—E. P. Michall has resigned his position as superintendent of the Atherton Mills, Charlotte, N. C.

—James H. Mills has resigned his position as overseer in the Hamilton Print Works, Lowell, Mass.

—L. D. Murphy has resigned his posias overseer of cloth room of the Hargraves Mill, Fall River, Mass., and accepted a similar position at the King Philip Mills, vice Mr. Hobson, resigned.

—A. B. Nelson is now chief engineer of the W. R. Kindley Mill, Mt. Pleasant, N. C.

George Paiden, formerly of the Lippit Mills, is now boss dyer at Hinsdale, N. H.

—A. B. Peterson, formerly of the Richland Mill, Columbia, S. C., is now superintendent of the Stanley Creek cotton mills, Stanley Creek, N. C.

—W. S. Porter is the new night superintendent of carding and spinning at the mill in Wilmington, N. C.

—Isaac Posner has resigned as foreman of the weaving department of the weaving department of the mill of the American Yarn Co., of Pawtucket, R. I.

—Clifford Ray of Valley Falls, R. I., has accepted a position in the designing department of the Manville Mills, Manville, R. I.

—Wm. N. Rea has resigned his position as engineer and machinist at the Wadesboro (N. C.) Cotton Mills. He is succeeded by Mr. McCoy, of the Pee Dee Mills, Rockingham, N. C.

—Wm. Reed was badly burned by a cover flying off a tank of boiling sizing, at the Bourne Mills, Fall River, Mass. He was removed to the Fall River hospital.

—George Reitz, of Dedham, Mass., has accepted a position with the Rock Mills, Rockville, Conn.

—N. C. Richardson has been appointed

boss weaver of the Kincaid Mill, Griffin, Ala.

—Chas. H. Savage has been appointed superintendent of the Boott Cotton Mills, Lowell, Mass. Mr. Savage was formerly superintendent of the Manville Woolen Co., Manville, R. I.

—W. M. Scranton is now night superintendent of the Blue Springs Mill at Oxford, Ala.

—T. M. Shipp, Jr., has resigned his position as superintendent of the Tuscaloosa mill at Cottondale, Ala.

—R. C. Sleigh is the new cloth room manager of a Charleston (S. C.) mill.

—C. P. Smith has accepted the position of second-hand in spinning at the Columbia (Ala.) Cotton Mills, rendered vacant by the resignation of T. O. Pope, who has removed to Columbus, Ga.

—Capt. E. A. Smyth, president of the Pelzer Mfg. Co., Pelzer, S. C., has left for a European tour.

—E. J. Steed of High Point, N. C., formerly with the Cornelius Mill at Davidson College, N. C., has secured a position as overseer of weaving in the mill at Natchez, Miss.

—James Stephens, formerly of Woolsley, is now boss weaver at the Roanoke Cotton Mills, Roanoke Rapids, N. C.

—Robert Stewart, formerly with the Slater Mill, Pawtucket, R. I., has been elected superintendent of the Shove Mill, Fall River, Mass., in place of Henry Glover, resigned.

—Manning Storey, Piedmont, S. C., has accepted a position in the weave room of the Catawba Mills, Chester, S. C.

—Joseph Thatcher, formerly boss dyer at Saundersville, Mass., has accepted a similar position at the dye works at St. Henri, Que., Canada.

—John F. Tibbetts is now superintendent of the Riverside Mills, Montmorency Falls, Que.

—G. B. Timanns has resigned his position as superintendent of the Cotton mills at Laurel, Md.

—F. E. Wagg has resigned his position as overseer of weaving in Acushnet Mill No. 2, New Bedford, Mass.

—F. O. Walton has been appointed secretary and treasurer of the Milford Cotton Mill Co., Fort Mill, N. C.

—Patrick Welch, formerly overseer of spinning for the Harris Textile Co., Phenix, R. I., is now with the Lawton Spinning Co., Olneyville, R. I.

—J. R. Wilson is now in charge of the spinning of mill No. 4, of the Odell Cotton Mills Co., of Concord, N. C.

—W. H. M. Woods, formerly superintendent with the Alpha Mill, Charlotte, N. C., has accepted a position as manager of the Natchez Manufacturing Co., Natchez, Miss.

Woolen.

—Charles Ainsworth has resigned his position as boss carder at the mill of E. Kenyon & Sons, Kenyon, R. I.

—Robert Batstone has accepted a position as boss finisher with Holden, Leonard & Co., Bennington, Vermont. Mr. Batstone was formerly at the New England Mills, Rockville, Ct.

—John S. Bellows, formerly superintendent of the Corporation Mill at Killingly, Conn., has been appointed manager of G. F. Whipple's mill, Mapleville, R. I.

—Joseph Bond, of Warren, Mass., is now overseer of finishing at the woolen mill at Eagle Lake, Mass.

—Walter Burdick, formerly of Ashaway, R. I., is now with the Potter Hill Mill.

—Joseph Cameron has resigned his position as designer at the Livingstone Woolen Mills, at Washington, R. I.

—J. C. Church has been elected director of the Cranston worsted mill in place of the late H. W. Church.

—John Cobb, formerly of Blackstone, Mass., has been engaged as overseer of carding at the Holliston Yarn Co., Holliston, Mass.

—E. E. Crawley has resigned his position as assistant superintendent for the Pomeroy Mills, Pittsfield, Mass. Mr. Crawley has been with the Pomeroy Mills for the past twelve years.

—Thomas Curtis, Jr., has been appointed second-hand in the card room at the White Mill in Voluntown, Conn.

—Arthur G. Davis is now overseer of weaving in the mill at Bemis, Mass.

—Mr. Dawson, of New London, Conn., has been appointed dyer for the Otrobando Woolen Co., Norwich, Conn.

—Chas. Eckland has been appointed loom fixer for the Windsor Falls Manufacturing Co., Adams, Mass.

—J. C. Evans will be the boss weaver in the new woolen mill at North Vassalboro, Me.

—M. H. Gallagher has resigned his position as boss carder and spinner with the Thayer Woolen Co., North Oxford, Mass., and has taken a similar position with Allen L. Taft, Spencer, Mass.

—George Gerry has resigned his position as overseer of the spinning room at the mill at East Rochester, Me. George Elliot will fill the vacancy caused by Mr. Gerry's resignation.

—Harry Gibbons, formerly at Tebo's Mill, Enfield, Mass., has accepted a position at Kauffman's mill, Athol, Mass.

—E. Payson Gibbs has resigned his position as overseer of carding in Mill No. 1 of the Manchaug Mills, Manchaug, Mass., and returned to his home in Biddeford.

—Daniel W. Hagar, of Jefferson, Mass., is now overseer of finishing with the woolen company at Quinapoxet, Mass.

—L. C. Harper has resigned his position as superintendent of the finishing room of the Lakeville Woolen Co., West Rutland, Mass.

—Thos. Hart, Jr. is now assistant superintendent at the Burlington Woolen Co., Winooski, Vt.

—L. Wardwell has been appointed overseer of looms of the Camden Woolen Co., Camden, Maine.

—L. M. Wheeler is now dresser tender with the Indian Spring Wooolen Co., Madison, Maine.

—Oscar White has accepted a position in the weave room of John Maquire & Son's mill at Chepachet, R. I.

—Joseph Bond has accepted aposition at the Eagle Lake Mill at Eagle Lake, Mass., he was formerly at Warren, Mass.

—Geo. Gerry has resigned his position as overseer of spinning in the Cocheco Woolen Co.'s mill at East Rochester, N. H., and has been succeeded by Geo. Elliot.

—H. B. Green has resigned his position as assistant superintendent of the Marland Mills, Andover, Mass. and has gone to Milwaukee, his home.

—Geo. Lyons has been appointed superintendent of the ingrain department of the Lowell Mfg. Company, Lowell, Mass.

—H. J. Maloney has accepted a position as overseer of carding at the Glen Woolen Mills, West Fitchburg, Mass.

—Robert C. Moran is now boss finisher of the Kimball Woolen Co., Huntington, Mass.

Knit.

—W. H. Ballard, formerly of Amsterdam, N. Y., is now in charge of the card room of the Rob Roy Hosiery Co., Troy, N. Y.

—Fred L. Beaman has resigned the position which he has held for the past 19 years as foreman in the finishing department of J. W. Busiel & Co.'s hosiery mill at Laconia, N. H.

—John N. Carpender, president of the Norfolk and New Brunswick Hosiery Co., has left for a European tour.

—Chas. H. Disbrow has resigned his position with the New York office of the Cascade mills to accept the management of a knitting mill in Plainville, Conn.

—B. A. Fryer is the new superintendent of the Bradford Knitting Mills, Bennington, Vermont.

—George Greene has been promoted to the position left vacant by John McClelland of the Cascade mills, New York. Mr. McClelland has been appointed selling agent for the mill.

—Norman P. Hatch has accepted a position as foreman in the finishing department of J. W. Busiel & Co.'s hosiery mill, Laconia, N. H., rendered vacant by the resignation of Fred L. Beaman.

—John J. Lally, formerly of Wilton, N. H., is now boss spinner for the N. E. Knitting Co., Winsted, Conn.

—Robert Van Tassel has resigned his position as assistant engineer at the Boston Duck Co.'s mill in Bondsville, Mass., and has accepted a post as chief engineer of the factory of the Shaw Stocking Co., Lowell, Mass.

—Chas. H. Disbrow has severed his connection with the New York office of the Cascade Mills to accept the management of a knitting mill in Plainville, Conn.

Miscellaneous.

—Dennis Bousette has resigned his position with the Heminway and Bartlett Silk Factory, Watertown, Conn., and has moved to Paterson, N. J.

—Palmer Brown, Jr., formerly of the Nourse Mill, Woonsocket, R. I., is now with the Providence & Fall River Steamship Co., Rocky Point, R. I.

—W. W. Crosby, who was formerly connected with the Mass. Institute of Technology, and has been teacher of mechanical drawing in the Lowell Textile School for the past year, has been appointed director of that school, vice C. P. Brooks resigned.

—J. C. Harrington, of Victory mills, N. Y., has gone to Mexico to take charge of the bleaching plant of Prince, Torres & Prince, Durango.

—David Mungall, formerly with the Menshanticut Dye Works, Cranston, R. I., has accepted a position as cotton dyer in the Skinner Silk Co.'s mill.

—Prof. Nelson of the Lowell Textile School has taken a month's vacation in England, accompanied by James T. Broadbent, clerk in the office.

—James Roberts of Yorkshire, England, has succeeded to the position rendered vacant by John Maddocks as managing director for Sir Titus Salts Sons & Co., Saltaire, England.

—Alexander G. Rogers was united in matrimony to Miss Laura E. Hayes, at the home of the bride, Fitchburg, Mass., recently. Mr. Roger's father is proprietor of the Clinton Worsted Mills.

—William R. Smith, superintendent of a cotton mill in Raleigh, N. C., will soon be married to Miss Helen Marion Kerr of Lawrence, Mass.

—Cornelius Supples, formerly with Hugo Dolge, Dolgeville, N. Y., is now overseer of dyeing at the felt works of Armour & Co., Chicago, Ill.

—John Villers had his jaw broken in the finishing room of the Fall River Bleachery, one night recently, just before the bleachery was shut down. He was taken to the Fall River Hospital.

—J. Walmsley, formerly chief engineer for the Richard Borden Mfg. Co., Fall River, Mass., has accepted a similar position with the Uncas Paper Mills, Norwich, Ct.

—J. Miller Wilson, manager of the Norwich Bleaching, Dyeing and Printing Works, Norwich, Conn., has left for a European tour.

—Mr. and Mrs. T. G. Becket, of Pittsfield, Me., are happy over the birth of a girl. Mr. Becket is designer for the Waverly Woolen Co. and instructor of the textile evening school in Pittsfield.

—Joseph Bennett, colorist, with the Windsor Company, North Adams, Mass., has returned from England.

—Vice president J. P. Delahunty, Jr., of the Delahunty Dyeing Machine Co., of Pittsburg, Pa., has been in the South on a business trip.

—W. T. Galey, president and treasurer of the Galey & Lord Mfg. Co., Chester, Pa., is on a trip to Europe.

—Albert Hackett, formerly of England and later with Connors Bros., of Holyoke, Mass. is now at E. M. Rockwell's mill, Leominster, where he has been in charge of dyeing for the past two years.

—Albert Jones, dyer at the Hecla mill, Uxbridge, Mass. has been spending a few days with friends in Leominster.

—James Ranney has opened a dye house in Waterford, N. Y. For several years he was boss dyer at the Hudson Valley Knitting Mill of Waterford.

—O. Rauschenberg has been selected to succeed T. Bryan, as chief engineer at the Kincaid Mill, Griffin, Ga.

Deaths.

—Frederick Alms, president of the Argonaut Cotton Mills Co., died recently, age 60 years.

—Joseph Banigan, formerly president of the U. S. Rubber Co., Woonsocket Rubber Co., American Wringer, Co., died recently at his home in Providence, R. I. age 59 years.

—W. W. Brigg died suddenly at his home in Atlanta, Ga. Mr. Brigg has invented many excellent textile patents in the way of anatomizers, humidifiers and other inventions on the same principle.

—Geo. F. Cummings, for twelve years superintendent at the Stoneville Mfg. Co., Worcester, died recently. Mr. Cummings has been engaged in the mill business in Lowell, Nashua and Manchester, N. H.

—Albert Curtis of Worcester, Mass., died of asphyxiation. Mr. Curtis built the first machines for shearing and trimming cotton cloth made in this country. He was senior partner of the firm of Curtis & Marble, manufacturers of fine woolen machinery.

—B. Dix, who has been for many years associated with the firm of M. Brown, Jones & Co., woolen manufacturers of Philadelphia, died recently.

—Benjamin Groff died Aug. 27th in New Hartford, N. Y., at the age of 66 years. For over 20 years he was superintendent of the Chadwick's mills and when the Chadwick Mills Cotton Co. was organized Mr. Groff was elected treasurer. He afterwards succeeded to the office of president, which post he held for over ten years.

—Artemus E. Haling died recently at his home in Rockville Ct., aged 73 years. He was a wool sorter, and for years had charge of the sorting at the mills in So. Coventry. He leaves a wife and three sons.

—Hon. Rowland Hazard died at Glen Springs, N. Y., recently, at the age of 69 years. Mr. Hazard was president of the Peacedale Manufacturing Co. and Solway Process Co. of Syracuse, N. Y.

—John M. Hughes, senior member of the hosiery firm of Hughes & Hoffman of Williamstown, Pa., was killed recently. Mr. Hughes slipped beneath the wheels of a moving train while bidding his daughter good-bye, and was instantly killed. He was 50 years of age, a veteran in the late war, and is survived by a widow and two children.

—Erwin M. Hunt, formerly overseer in the finishing room of J. D. Clark Co.'s mill, Greenville, Mass., died recently at the Worcester City Hospital.

—James F. Iler died recently at his home in Greenwood, S. C. He was for many years a resident of Piedmont, S. C., and was connected with several of the mills there.

—John Island for the past 18 years superintendent of Rawitsar & Bros.' wool and shoddy factory at Mystic, Conn., died recently, aged 58 years.

—Z. F. Jackson, formerly chief engineer of the cotton mills at Union, S. C., died at his home recently.

—Adam W. Kline of Amsterdam, N. Y., died recently at the age of 80 years. Mr. Kline at one time was proprietor of a knitting mill in Amsterdam and was elected state senator in 1865.

—Samuel La Rhett died recently, aged 49 years. Mr. La Rhett was for several years boss dyer of the Allen Woolen Mills, Hanover, Conn.

—Chas. Noska died recently in Philadelphia, Pa. Mr. Noska was at one time engaged in the manufacture of towelling and table linen in partnership with Elliott Leech at Manayunk, under the firm name of Leech & Noska.

—R. C. Pennel, formerly pay-master of the Continental Mills, died suddenly at his home at Mere Point, recently, aged 76.

—Hon. Dexter Richards, who was at one time interested in the flannel mill at Newport, N. H., died recently, aged 80 years.

—Josph Shaw died at his home in Fall River, Mass., at the age of 53 years. Mr. Shaw was superintendent of the Flint Mills, previous to which he occupied the position of superintendent of the Conanicut Mills. He was a veteran of the late war, a member of many lodges, and superintendent of St. Marks Sunday School. He leaves a wife and six children.

—Geo. E. Shortwell, who was for the last three years boss dyer in the Globe Woolen Mills, Utica, N. Y., died recently after a short illness.

—Wm. L. Warner of the firm of John Warner's Sons, knit goods manufacturers, Amsterdam, N. Y., died recently, aged 31. Mr. Warner had charge of the New York office of the concern.

—Chandler Wetherbee, a former cotton cloth manufacturer at Lawrence and Springfield, Mass., died recently at his home in Worcester, Mass.

—Emil Zinderstein died recently of typhoid fever at Allentown, Pa. Mr. Zinderstein was assistant superintendent of the Palace silk mill, So. Allentown, Pa. for the past six years.

—John G. Morrison died at his home in New York city recently. He was for a number of years a dealer in chemicals and dyestuffs.

—William L. Warner, a member of the firm of John Warner's Sons, knit goods manufacturers of Amsterdam, New York, died recntly. He was in charge of the New York Office.

BUYERS' INDEX.

Advertisers whose names do not appear under desired headings will please notify the publishers. Such omissions are accidental, not intentional.

Alphabetical Index to Advertisements follows this Classified List.

Architects and Mill Engineers.
Berlin Iron Bridge Co, The, East Berlin, Ct.
Ferguson, John W, Paterson, N. J.

Automatic Boiler Feeds.
D'Este & Seeley Co, 29 Haverhill St, Boston,

Automatic Feeds for Cotton and Wool.
Harwood, Geo. S, & Son, 53 State St, Boston.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Balling Machine.
Torrance Mfg. Co, 18 Davis St, E. Newark, N. J.

Bandings.
See under Yarns.

Belting.
Alexander Bros., 410 No. 3d St., Phila., Pa.
Billington, J. H. & Co., 113 Chestnut St., Philadelphia.
Boston Belting Co., 256 Devonshire St., Boston, Mass.
Fell, Geo. & Son, Bolton, England.
Link Belt Machinery Co., Chicago, Ill.
See also Mill Supplies.

Belt Dressing.
Alexander Bros, 410 No. 3d St, Phila, Pa.

Bindings.
See Tapes and Braids.

Bleaching Materials.
Roessler & Hasslacher Chemical Co, 100 William St, New York.

Boiler Compounds.
Carr Manufacturing Co., 69 Beverly St, Boston.

Boxes, Cloth Boards, Etc.
Flanders, E A, North Dexter, Me.
Pearson, J. T, Kensington, Pa.

Braids.
See Tapes, Braids and Edgings.

Burr Pickers.
Curtis & Marble Machine Co., Worcester, Mass.
Sargent's, C. G., Sons, Graniteville, Mass.

Card Clothing.
Ashworth, Elijah, Fall River, Mass.
Leigh, Evan A, 35 Mason Building, Boston.

Calico Printers' Machinery and Supplies.
Butterworth, H. W., Sons & Co., Philadelphia.
New Bedford Copper Co, New Bedford, Mass.
Phillips Co, The Thomas, Providence, R. I.
See also Dyeing, Bleaching Machinery, etc.

Carders' Tools.
Brown, W. H, Mechanic St, Worcester, Mass.

Carpet Machinery.
Altemus, W. W, & Son, 2816 N. 4th St, Phila, Pa.
Crompton & Knowles Loom Works, Worcester, Mass.
Curtis & Marble Machine Co, Worcester, Ms.
Furbush, M. A, & Son, Machine Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St., Phila., Pa.

Chemicals and Apparatus.
Bullock & Crenshaw, 528 Arch St, Phila, Pa.
Roessler & Hasslacher Chemical Co, 100 William St, New York.

Chemist.
Adriance, John S., 105 East 39th St., New York.

Cloth Testing Machine.
McKnight, S, 771 Broadway, New York.

Combs (Wool and Cotton).
Crabb, William, & Co, Newark, N. J.
Townsend, Thomas, 157 Orange St., Providence, R. I.

Comber Needles.
Townsend, Thos., Providence, R. I.

Copper Print Rollers.
New Bedford Copper Co, New Bedford, Mass.
Phillips Co, The Thomas, Providence, R. I.
Revere Copper Co, 174 Oliver St, Boston.

Copper Work for Dyers.
Phillips Co, The Thomas, Providence, R. I.

Cotton (Egyptian).
Stoddard, Haserick, Richards & Co., Boston.

Cotton Machinery.
Altemus, W. W, & Son, 2816 N. 4th St, Phila-Pa.
Ashworth, Elijah, Fall River, Mass.
Cobb, Thad. S., Machinery Co , Lowell,
Crompton & Knowles Loom Works, Worcester, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Draper Company, Hopedale, Mass.
Fairmount Machine Co, 22d and Wood Sts, Philadelphia.
Howard & Bullough American Machine Co, Pawtucket, R. I.
Kilburn, Lincoln & Co, Fall River, Mass.
Leigh, Evan A, 35 Mason Building, Boston.
Lowell Machine Shop, Lowell, Mass.
Mason Machine Works, Taunton, Mass.
Phillips Co, The Thomas, Providence, R. I.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Townsend, Thomas, 157 Orange St., Providence, R. I.
Whitin Machine Wks, Whitinsville, Mass.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Cotton Openers and Lappers.
Howard & Bullough American Machine Co, Pawtucket, R. I.

Cotton Presses.
Planters' Compress Co, 89 State St, Boston.

Cutters for Knit Fabrics.
Kennedy, Thos. (Cutters, etc.,) Cohoes, N. Y

Damper Regulators.
D'Este & Seeley Co. (Curtis), 29 Haverhil St, Boston, Mass.

Designers.
Fresnel, Gustave, 125 W. 56th St, N. Y.

Dextrine.
Stein, Hirsh & Co, 165 Duane St., New York.

Dryers.
Philadelphia Textile Machinery Co, Philadelphia, Pa.
Phillips Co, The Thomas, Providence, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Dusters.
See Wool and Waste Dusters.

Dyeing, Bleaching and Finishing.
Brophy's, T, Sons, Jasper St, Philadelphia.
Greenwood, R, & Bault, Frankford, Pa.

Home Bleach & Dye Works, Pawtucket and Valley Falls, R. I.
Littlewood, G. J., & Sons, Manayunk, Pa.
Warren, W, Thread Works, Westfield, Mass.
Webster Dye Works, Webster, Mass.

Dyeing, Drying, Bleaching and Finishing Machinery.

Butterworth, H. W, & Sons Co, Phila, Pa.
Curtis & Marble Machine Co, Worcester, Mass.
Fairmount Machine Co, 22 and Wood Sts, Philadelphia.
Granger Foundry & Machine Co, Providence, R. I.
Hopkins, A, & Co, Bridgeton, R. I.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Lincoln, The, Co, 54 Arch St, Hartford, Ct.
Phenix Iron Foundry, Providence, R. I.
Phillips, The Thomas Co, 91-95 South Main St, Providence, R. I.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass. (Drying.)
Woonsocket Machine & Press Co, Woonsocket, R. I.
Woonsocket Napping Machine Co, Woonsocket, R. I.

Dye Sticks.

Haedrich, E. M, 311 1-2 Walnut St, Phila, Pa.

Dyestuffs and Chemicals.

Amend Process Co., 205-211 Third Ave., New York.
Anchor Color Mfg. Co, 464 Cherry St, New York.
Bischoff, & Co, 87 Park Place, N. Y.
Bosson & Lane, 36 Central Wharf, Boston.
Cochrane Chemical Co., 50 Kilby St., Boston.
Corey, S. J, 273 Congress St, Boston.
Dillon & Co, 20 Cedar St, New York.
Farbenfabriken of Elberfeld Co, 40 Stone St, N. Y.
Geisenheimer & Co, 189 Front St, New York.
Hanna-Schoellkopf Co, Philadelphia, Pa.
Holliday, Read, & Sons, 100 William St., New York.
Innis & Co, 3 Cedar St, New York.
Jaeck Bros., The, Co., 62-68 No. 11th St, Brooklyn, N. Y.
Janney, O. S, & Co, Phila. and Boston.
Johnson, Chas. A, & Co, 22 Dey St, N. Y.
Johnson, Wm. G, & Co, Uncasville, Conn.
Keller, John J, & Co, 104-106 Murray St, N. Y.
Klipstein, A, & Co, 122 Pearl St, N. Y.
Koechl, Victor, & Co, 122 Hudson St, N. Y.
Matheson, W. J, & Co, 182-184 Front St, N. Y.
Merrimac Chemical Co, Boston, Mass.
N. Y. & Boston Dyewood Co, 53 Beekman St, New York.
Oakes Mfg. Co, 93 Pearl St, N. Y.
Pickhardt & Kuttroff, New York.
Roessler & Hasslacher Chemical Co, 100 William St , New York.
Sharpless Dye Wood Ext. Co, 22 N. Front St, Phila, Pa.
Stamford Mfg. Co, 133-137 Front St., N. Y.
Stone & Ware Co, The, 157 Maiden Lane, N. Y.
Sykes & Street, 85 Water St, N. Y.
Thomas, N. Spencer, Elmira, New York.
Webster Dye Works, Webster, Mass.

Dyers and Finishers.

Boston Finishing Works, Williamstown Mass.
Cranston Worsted Mills (yarns), Bristol R. I.
Firth & Foster Co, Kensington, Pa.
Greenwood, R, & Bault, Frankford, Pa.
Home Bleach & Dye Works, Pawtucket, R. I.
Oakdale Dye Works, 913 W. York St, Phila, Pa.
Pawtucket Dyeing & Bleaching Co, Pawtucket, R. I.
Warren, W. Thread Works, Westfield, Mass.
Webster Dye Works, Webster, Mass.

Dyers' Clogs.

Wildman, Jos, & Co, 1908 N. Front St, Phila.

Edgings.

See Tapes, Braids and Edgings.

Electrotyping and Printing.

Whitcomb, H. C, & Co, Boston.

Elevators.

Cohoes Foundry & Machine Co, Cohoes, N.Y.
Eastern Machinery Co, The, New Haven, Conn.
Howard, Geo. C., 1783 Barker St., Phila., Pa.

Engineers, Mechanical.

Berlin Iron Bridge Co, E. Berlin, Ct.
Ferguson, John W, Paterson, N. J.

Express Money Orders and Travelers' Cheques.

American Express Co. offices in every city

Fans—Exhaust and Ventilating.

See Ventilating Apparatus.

Feeders

See Card Feeds.

Feed Water Pumps.

Goulds Mfg. Co, Seneca Falls, N. Y.
Phœnix Iron Foundry, Providence, R. I.

Finishing Machinery.

See Dyeing, Drying, Bleaching and Finishing.

Fluted Rolls.

Cohoes Foundry & Machine Co, Cohoes, N.Y
Thurston, A. G, & Son, Box 528, Fall River, Mass.

Fulling Mills for Woolen Goods.

Hopkins, A, & Co. Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter Jas, Machine Co, No. Adams, Mass.

Gas Engines.

Jones, Lewis, 60½ and Media Sts, Phila, Pa.

Gas Singeing Machines.

Butterworth, H. W, Sons Co., Philadelphia.
Curtis & Marble Machine Co, Worcester, Ms.

Gear Cutting Machine.

Blaisdell, P, & Co, Worcester, Mass.
Whiton, The D. E, Co, New London, Conn.

Harness Varnish.

D. L. Witmer & Bro, 5th St. and Germantown Ave, Philadelphia.

Heating.

See Ventilating.

Heddles.

Watson, L. S, Mfg. Co, Leicester, Mass.

Hosiery Boards.

Pearson, J. T, Kensington, Pa.

Hose and Rubber Goods.

Boston Belting Co., 256 Devonshire St., Boston.

Ink, Stamping.

Witmer, D. L, & Bro, 5th St. and Germantown Ave, Philadelphia.

Insurance (Employers' Liability).

Employers' Liability Assurance Co, 28 Central St, Boston, Mass.

Knit Goods Edgings, Trimmings, etc.

Cheney Bros, Silk Goods, 479 Broome St, N. Y.
Friedberger & Co, Edgings, Germantown Phila, Pa.
Hepner & Horwitz, Lacings, 30 Howard St, N. Y.
Krout & Fite Mfg. Co, 2632 Mascher St, Phila.
Weimar Bros, 1817 East York St, Phila. Pa.

Knit Goods Finishing Machines, Crochet, Etc.

Excelsior Sewing Machine Co, 120 N. 7th St, Phila, Pa.
Merrow Machine Co, The, Hartford, Conn.
Nye & Tredick, 606 Arch St, Phila, Pa.
Scott & Williams, 2079 E. Cumberland St, Phila, Pa.

Knit Goods Brushers.

Ardrey, S. B, & Sons, Bristol, Pa
Jones, Lewis, Philadelphia, Pa.

Knitting Machine Cylinders.

Paxton & O'Neill, 129 Bread St, Phila, Pa.
Stafford & Holt, Little Falls, N. Y.

Knitting Machinery.

Boss Knitting Machine Works, Elm and Reed Sts., Reading, Pa.

Branson Machine Co., 506 John St., Philadelphia.
Brinton, H, & Co, 213 Race St, Phila, Pa.
Campbell & Clute, Cohoes, N. Y.
Cooper, Chas, Bennington, Vt.
Crane Mfg. Co, Lakeport, N. H.
Excelsior Knitting Machine Manufacturing Co., Allentown, Pa.
Hepworth & Co, Lehigh Ave. and Mascher St, Phila, Pa.
Jenckes, E. Mfg. Co, Pawtucket, R. I.
Jones, Lewis, 60 1-2 and Media Sts, Philadelphia, Pa.
Kennedy, Thos. (Cutters, etc.), Cohoes, N. Y.
Keystone Knitting Machine Mfg. Co, 40 No. 7th st, Philadelphia, Pa.
Lamb Mfg. Co., Chicopee Falls, Mass.
Leighton Machine Co, Manchester, N. H.
Little Hustler Napper Co., Hudson, N. Y.
Mayo Knitting Machine & Needle Co, Franklin, N. H.
McMichael & Wildman Mfg. Co, Norristown, Pa.
Mueller, A, 700 Lexington Ave, Brooklyn, N. Y.
Nye & Tredick, 606 Arch St, Phila, Pa.
Paxton & O'Neill, 127 Bread St, Phila, Pa.
Pepper Mfg. Co, Lakeport, N. H.
Scott & Williams, 2079 E. Cumberland St., Phila., Pa.
Stafford & Holt, Little Falls, N. Y.
Standard Machine Co., 508 Minor St., Philadelphia, Pa.
Taylor, James, 835 Arch St, Phila, Pa.

Knitting Needles and Supplies.

Breedon, Wm, & Son, Amsterdam, N. Y.
Cooper, Chas, Bennington, Vt.
Corey, Wm, Co, Manchester, N. H.
Crane Mfg. Co, Lakeport, N. H.
Dodge Needle Co., Manchester, N. H.
Goldstein, J. 416 Arch St., Philadelphia.
Ives, Loyal T. New Brunswick, N. J.
Keystone Knitting Machine Mfg. Co, 40 No. 7th st, Philadelphia, Pa.
Lydall, H, & Fouids, Manchester, Conn.
Manufacturers' Supplies Co., 66 No. 4th St., Philadelphia.
Mayo Knitting Machine & Needle Co, Franklin, N. H.
Page Needle Co, Chicopee Falls, Mass.
Treat, Orion, Manchester Green, Conn.
Wardwell Needle Co, Lakeport, N. H.

Laboratory Outfits.

Bullock & Crenshaw, 528 Arch St Phila, Pa.

Lamps, Electric.

Lynn Incandescent Lamp Co., Lynn, Mass.

Looms.

Crompton & Knowles Loom Works, Worcester, Mass.
Draper Company, Hopedale, Mass.
Fairmount Machine Works, 22d and Wood Sts. Philadelphia.
Furbush, M. A, & Son Co, Phila, Pa.
Howard, Geo. C., 1783 Barker St, Phila Pa. (For wire.)
Kilburn, Lincoln & Co, Fall River, Mass.
Lowell Machine Shop, Lowell, Mass.
Mason Machine Works, Taunton, Mass.
Whitin Machine Works, Whitinsville, Ms,
Woonsocket Machine & Press Co, Woonsocket, R. I.

Loom Picker Manufacturers.

Crompton & Knowles Loom Works, Worcester, Mass.
Loom Picker Co, Biddeford, Me.

Lubricators.

Dixon, Jos, Crucible Co, Jersey City, N. J.

Lumber.

Stearns, A. T, Lumber Co, Neponset, Mass.

Lumpers.

Gerry, George, & Son, Athol, Mass.

Machinery Dealers.

Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.

Machinery Wipers.

American Silk Mfg. Co, 311 Walnut St Philadelphia, Pa.

Machinists' Tools.

Bialsdell, P, & Co, Worcester, Mass.
Whiton, The D. E. Co, New London, Conn.

Mails.

Walder, J, Paterson, N. J.

Measuring and Folding Machines.

Curtis & Marble Machine Co, Worcester, Ms.
Elliott & Hall, 54½ Hermon St, Worcester Mass.

Mills For Sale.

Denny, R. B., 143 Federal St., Boston.

Mill Builders and Engineers.

Berlin Iron Bridge Co, The, East Berlin, Ct
Ferguson, John W, Paterson, N. J.

Mill Supplies.

American Supply Co, Providence, R. I.
Bamford & Smith, Pascoag, R. I.
Bristol, The, Co., Waterbury, Conn
Buckley's, Benj. Son, Gun Mill, Paterson, N. J.
Douglas Manufacturing Co., Fall River, Mass.
Harwood, Geo. S, & Son, 53 State St, Boston.
Hill, Jas, Mfg. Co. Providence, R. I.
Jefferson, Ed, & Bro, 28 Strawberry St, Phila, Pa.
Nashua Spool & Bobbin Co, Nashua, N. H.
Spofford, Wm. S, & Son, 5-11 Culver St, Providence, R. I.
Thurston, A. G, & Son, Fall River, Mass.
Watson, L. S, Mfg. Co, Leicester, Mass.

Napping Machines.

American Napping Machine Co, Williamstown, Mass
Ardrey, S. B, & Sons, Bristol, Pa.
Curtis & Marble Machine Co, Worcester, Mass.
Jones, Lewis, 60 1-2 and Media Sts., Philadelphia, Pa.
Little Hustler Napping Co, Hudson, N. Y.
Woonsocket Napping Machine Co, Woonsocket, R. I.

Novelties.

Stohn, C, 178 Green St, Jamaica Plain, Mass.

Oil Filters.

Robertson, Jas. L, & Sons, 204 Fulton St, New York.

Pantagraphs for Mill Engraving.

Johnson, C. A, & Co, 21 Dey St, New York.

Patent Solicitors.

Crosby & Gregory, 34 School St, Boston, Mass.
Crossley & Goddard, 23 Court St, Boston.
Massink, H., Amsterdam, Holland.
Phillips & Anderson, 53 State St, Boston.
Wright, Brown & Quinby, 53 state St, Boston, Mass.

Penstocks.

Dalrymple, George, Fair Haven, Vt.

Perforated Copper

Beckley, A. J. & Co., Garwood, N. J.

Peroxide of Sodium.

Roessler & Hasslacher Chemical Co., 100 William St, New York.

Picker Sticks.

Loom Picker Co., Biddeford, Me.

Picking, Carbonizing and Garnetting.

Garfield Woolen Co, Garfield, N. J.
Kennebec Woolen Mills 2025 Naudain St., Philadelphia.

Pipe Covering (Magnesia).

Keasby, R. A. 54 Warren St, New York.
Keasby & Mattison Co, Ambler, Pa.
Nightingale, S. C, & Childs, Atlantic Ave Boston, Mass.

Pneumatic Conveying.

See Ventilating.

Power Transmitting Machinery.

Channon, H, Co, 25 Market St. Chicago, Ill.
Eastern Machinery Co, New Haven, Conn.
Fairmount Machine Works, 22d and Wood Sts, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.

Hunt, C. W. Company, Staten Island, N. Y.
Hunter, Jas, Machine Co, No. Adams, Mass.
Jones, W. A, 53-59 South Jefferson Street, Chicago, Ill.
Kilburn, Lincoln & Co, Fall River, Mass.
Link Belt Machinery Co, Chicago, Ill.

Presses.

Crawford, J. J, & Son, Nashua, N. H. (Power Screw, Hydraulic, Hollow Steam Plate.)
Curtis & Marble Machine Co, Worcester, Ms.
Hart, Charles, Frankford, Philadelphia.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Hunt, C. W. Co, Staten Island, N. Y.
Phillips Co, The Thomas, Providence, R. I
Pownall, F. H, Iron Works, Jamesburg, N. J.
Sullivan Machinery Co., Claremont, N. H.
Woonsocket Machine & Press Co, Woonsocket, R. I.

Pressing Irons, Gas and Air Heated.

Sheftall, C. H, Mgr, 305-307 Mercer St, New York.

Pressure Regulators for Steam and Water.

D'Este & Seeley Co. (Curtis) 29 Haverhill St, Boston, Mass.

Printers and Embossers.

Novelty Textile Printing Co, 447-449 W. 14th St, New York.

Pumps.

Goulds Mfg. Co, Seneca Falls, N. Y.

Reed and Harness Manufacturers.

American Supply Co, Providence, R. I.
Loom Picker Co, Biddeford, Me.
Walder, J, Paterson, N. J.

Ribbons.

Cheney Bros, S. Manchester, Ct.

Roller Skins.

Fell, Geo, & Son, Bolton, England.

Roofing, Gravel, Slag and Composition.

Armitage Mfg. Co, Richmond, Va.
Johns, H. W., Mfg. Co., 100 William St. New York.
Warren Chemical & Mfg. Co, 45 Fulton St, New York.

Roofing, Paint and Paper.

Armitage Mfg. Co, Richmond, Va.

Roving Cans and Sheet Metal Work for Mills.

Hill, Jas, Mfg. Co, Providence, R. I.
Laminar, Fiore Co., No. Cambridge, Mass.
N. E. Ventilating & Heating Co, 930 Manton Ave. Providence, R. I.
Sullivan Machinery Co, Claremont, N. H.

Sample Cards.

Yerrington, F. M, 17 Batterymarch Street, Boston.

Schools.

Brooks, C. P., Lowell, Mass.
Gavey Correspondence School of Textile Design. P. O. Box 222, Brooklyn, N. Y.
Lowell Textile School, Lowell, Mass.
Philadelphia Textile School, Phila, Pa.

Sewing Machines and Supplies.

Curtis & Marble Machine Co, Worcester, Mass.
Frame, Gibbons, 2nd and Diamond Sts, Phila, Pa.
Manufacturers' Supplies Co , 66 No. 4th St., Philadelphia.
Nye & Tredick, 606 Arch St, Phila, Pa.
Scott & Williams, 6th and Arch Sts, Phila, Pa.

Shearing Machinery.

See Dyeing, Drying, Bleaching and Finishing.

Shell Rolls.

Cohoes Foundry & Mach. Co, Cohoes, N. Y.
Thurston, A. G, & Son, Box 528, Fall River, Mass.

Shoddies.

See Wool Shoddies.

Shuttles.

See Bobbins, Spools, Shuttles, Etc.

Silk Machinery.

Butterworth, H. W. Sons Co, Philadelphia.
Crompton & Knowles Loom Works, Worcester, Mass.

Singe Plates.

Butterworth, H. W. Sons Co., Philadelphia.
New Bedford Copper Co, New Bedford, Ms.

Sizing, Starch and Gums.

American Glutrose Works, Penn Mutual Bldg. Phila, Pa.
Columbia Mfg. Co, 143-151 Pocasset St, Fall River, Mass.
Stein, Hirsch & Co, 165 Duane St, New York.

Slashers.

Cohoes Foundry & Machine Co, Cohoes, N. Y.
Lowell Machine Shop, Lowell, Mass.
Phillips Co, The Thomas, Providence, R. I.

Soaps.

India Alkali Works, Boston, Mass.

Spindles.

Buckley, Benj's, Sons, Gun Mill, Paterson, N. J.
Draper Company, Hopedale, Mass.
Ward & Vandegrift, Elmer, N. J.
Whitin Machine Wks, Whitinsville, Mass.

Spindle Tubes.

Bamford & Smith, Pascoag, R. I.

Spinning Cylinders.

Hill, Jas, Mfg. Co, Providence, R. I.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.

Spinning Frames.

See Cotton Machinery.

Spinning Frames for Wool

Woonsocket Machine and Press Co., Woonsocket, R. I.

Spinning Rings.

Draper Company, Hopedale, Mass.
Whitinsville Spinning Ring Co, Whitinsville, Mass.

Spinning Tubes.

Buckley, Benj's. Son, Gun Mill, Paterson, N. J.

Steam Boilers.

Brown, C. H, & Co, Fitchburg, Mass.

Steam Boiler Insurance.

Hartford Steam Boiler Inspection & Insurance Co, Hartford, Conn.
Mutual Boiler Insurance Co, 31 Milk St, Boston.

Steam Damper Regulators.

D'Este & Seeley Co, 29 Haverill St, Boston Mass.

Steam Engines.

Brown, C. H, & Co, Fitchburg, Mass.
Hooven (The), Owens & Reutschler Co, Hamilton, O.

Steam Separators.

D'Este & Seeley Co. (Curtis), 29 Haverill St., Boston.
Robertson, Jas. L, & Sons, 204 Fulton St, New York.

Steam Specialties.

Butterworth, H. W. Sons Co., Philadelphia.
D'Este & Seeley Co, 29 Haverhill St, Boston
Haines, W. S. C 136 South 4th St, Phila, Pa.
Robertson, Jas L, & Sons, 204 Fulton St, New York.

Steam Traps.

D'Este & Seeley Co. (Curtis) 29 Haverhill St, Boston, Mass. (return float and expansion).
Haines, W. S. C 136 South 4th St, Phila, Pa.

Tanks, Tubs and Vats.

Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Challenge Wind Mill & Feed Mill Co, 195 High St, Boston, Mass.
Corcoran, A. J, 11 John St, New York.
Cypress Lumber Co, Apalachicola, Fla.
Stearns, A. T, Lumber Co, Neponset, Mass.
Woolford, George, 2240 No. 9th St, Phila, Pa

Tapes, Braids and Edgings.
Friedberger & Co, Germantown, Pa.
Goff, D. & Sons, Powtucket, R. I.
Krout & Fite Mfg. Co., 2632 40 Mascher St., Philadelphia.
Weimar Bros, 1817 East York St, Phila, Pa.
Young, Wm. M, 3638-40 Frankford Ave, Philadelphia, Pa.

Temperature Regulators.
D'Este & Seeley Co, 29 Haverhill St, Boston.
Haines, W. S. C, 136 South 4th St, Phila, Pa.

Tentering Machines.
See Dyeing, Bleaching Machinery, Etc.

Tension Pulleys.
N. E. Ventilating & Heating Co, 930 Manton Ave, Providence, R. I.

Testing Machines.
Howard, Geo. C., 1783 Barker St., Phila., Pa

Towers.
Caldwell Co., W. E. 202 Brook St., Louisville, Ky.
Challenge Wind Mill & Feed Mill Co, Boston, Mass.

Traveler's Cheques.
American Express Company.

Turbines.
(See Water Wheels.)

Valves.
D'Este & Seeley Co, 29 Haverhill St, Boston Mass.

Ventilating Apparatus.
Allington & Curtis Mfg. Co, Saginaw, Mich., and East Cambridge, Mass.
Berry, A. Hun, 23 W. 1st St, Boston, Mass.
Massachusetts Fan Company, Room 641, 53 State St, Boston.
New England Ventilating & Heating Co, Providence, R. I.
Philadelphia Textile Machinery Co, Hancock St, above Lehigh Ave, Phila, Pa.
Sargent's, C. G., Sons, Graniteville, Mass.
Sturtevant, B. F. Co, 34 Oliver St, Boston, Mass.

Washers (Cloth).
Hopkins, A, & Co. Bridgeton, R. I.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Phillips Co, The Thomas, Providence, R. I.

Watches and Clocks.
Elgin National Watch Co., Elgin, Ill.

Watchman's Clock.
Eco Magneto Clock Co, 620 Atlantic Ave, Boston.
Nanz & Co, 116A Chambers St, New York.

Water Pressure Regulators.
D'Este & Seeley Co, 29 Haverhill St, Boston.

Water Wheels.
Bradway, C. P, West Stafford, Conn.
Christiana Machine Co, Christiana, Pa.
Humphrey Machine Co., Keene, N. H.
Hunt, Rodney, Machine Co, Orange, Mass.
Leffel, James, & Co, Springfield, O.

Water Wheel Governors.
Bradway, C. P, West Stafford, Ct.
Cohoes Foundry & Machine Co, Cohoes N. Y.
Leffel, James & Co, Springfield, Ohio.
Lombard Water Wheel Governor Co, 61 Hampshire St, Boston.

Winders. (Hosiery.)
Universal Winding Co, 226 Devonshire St, Boston.

Wood Pulleys.
Saginaw Manufacturing Co, Saginaw, Mich.

Wool.
Lyon, John H, & Co, 12 Reade St, N. Y.

Wool Cleaning Compound.
India Alkali Works, Boston.

Wool Combing Machinery.
Crabb, Wm, & Co, Newark, N. J.
Crompton & Knowles Loom Works, Worcester, Mass.
Townsend, Thomas, 157 Orange St, Providence, R. I.

Wool Extracts.
Garfield Woolen Co, Garfield, N. J.

Wool and Waste Dusters.
Gerry, Geo, & Son, Athol, Mass.
Sargents', C. G., Sons, Graniteville, Mass.
Stillman-Randall Machine Co, Westerly, R. I.

Woolen and Worsted Machinery.
Altemus, W. W, & Co, 2816 N. 4th St, Phila Pa.
Butterworth, H. W. Sons Co., Philadelphia.
Cobb, Tnad. S., Machinery Co., Lowell, Mass.
Crompton & Knowles Loom Works, Worcester, Mass.
Curtis & Marble Machine Co, Worcester, Mass.
Fairmount Machine Works, 23d and Wood Sts, Philadelphia.
Furbush, M. A. & Son Machine Co, Phila, Pa.
Harwood, Geo. S, & Son, 53 State St, Boston.
Howard, Geo. C., 1783 Barker St., Phila., Pa.
Hunt, Rodney, Machine Co, Orange, Mass.
Hunter, Jas, Machine Co, No. Adams, Mass.
Jefferson, Ed. & Bro, 28 Strawberry St, Phila, Pa.
Philadelphia Textile Machinery Co., Hancock and Somerset Sts., Philadelphia.
Phillips Co. The Thomas, Providence, R. I.
Sargent's, C. G., Sons, Graniteville, Mass.
Stoddard, Haserick, Richards & Co, Boston, Mass.
Woonsocket Machine & Press Co Woonsocket, R. I.
Woonsocket Napping Machine Co., Woonsocket, R. I.

Wool, Hair and Noils.
Becker, Chas. W, Agt, Amsterdam, N. Y.
Fowles & Co, 106 Church St, Phila.

Wool Shoddies.
Barnett, William, 164 Broadway, Albany N. Y.
Becker, Chas. W, Agt, Amsterdam, N. Y.
Garfield Woolen Co, Garfield, N. J.
Kennebec Woolen Mills, 2025 Naudain St, Philadelphia.
Riverdale Woolen Co, Riverdale, Northbridge, Mass.

Wool Sorters and Scourers.
Kennebec Woolen Mills, 2025 Naudain St, Philadelphia.

Wool Washing, Preparing and Drying Machinery.
Phillips Co, The Thomas, Providence, R. I.
Sargent's, C. G, Sons, Graniteville, Mass.

Yarns, Threads, Etc.

Banding.

Moore, C. & Co, 12 S. 5th St, Phila, Pa.
Warren, W, Thread Works, Westfield, Mass.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.
Tucker & Cook Mfg. Co, Conway, Mass.
Whittier Cotton Mills, Lowell, Mass.

Cotton Yarns.

American Spinners' Cotton Yarn Exchange, 45 Milk St, Boston.
Burnet & Co., 24 George Sq, Glasgow, Scotland.
Catlin & Co, New York and Boston.
Clark, Wm. Co, Westerly, R. I.
Cohannet Mills, Taunton, Mass.
Dana Warp Mill, Westbrook, Me.
Eddy & Street, Providence, R. I.
Eichmann & Sternberg, 530 Broadway, cor. Spring St., N. Y.
Germantown Spinning Co, Germantown, Pa.
Grant Yarn Co, Fitchburg, Mass.
Greene & Daniels Mfg. Co, Pawtucket, R. I.
Hadley Co, Holyoke, Mass.
Hawes, O. S, & Bro, Fall River, Mass.
Indian Orchard Co., Indian Orchard, Mass.
Jenckes, E., Mfg. Co., Pawtucket, R. I.
King, Alex, & Co, 54 Leonard St, New York City.
Mitchell, Jas. E, & Co, Boston and Phila, Pa.
Montgomery, J. R, Co, Windsor Locks, Ct.
Monument Mills, Housatonic, Mass.

Orswell Mills, Fitchburg, Mass.
Sanford Spinning Co, Fall River, Mass.
Tucker & Cook Mfg. Co, Conway, Mass.
Whittier Cotton Mills, Lowell, Mass.

Gassed Yarns.

Greene & Daniels Mfg. Co, Pawtucket, R. I.
King, Alex, & Co, 54 Leonard St, New York.

Glazed Yarns.

Eichmann & Sternberg, 530 Broadway, cor. Spring St., N. Y.
Indian Orchard Co., Indian Orchard, Mass.
King, Alex, & Co, 54 Leonard St, New York.
Malcolm Mills Co, Frankford, Pa.
Montgomery & Co, J. R, Windsor Locks, Ct.
Warren W, Thread Works, Westfield, Mass.
Whittier Cotton Mills, Lowell, Mass.

Harness Twines.

Fawcett, Hughes, 115 Franklin St., N. Y.
Hadley Co, 90 Milk St, Boston, Mass.
King, Alex, & Co, 54 Leonard St, New York.
Moore, C, & Co., (S. W. cor. 5th and Market Sts.)
Warren, W, Thread Works, Westfield, Mass.
Whittier Cotton Mills, Lowell, Mass.

Hosiery and Knitting Yarns.

American Spinners' Cotton Yarn Exchange, 45 Milk St. Boston, Mass.
Boyer, B. F, & Co, Camden, N. J.
Campbell, Geo, & Co, Phila, Pa.
Clark, Wm. Co, Westerly, R. I.
Clasgens, The J. & H. Co, New Richmond, Ohio.
Cohannet Mills, Taunton, Mass.
Colchester Mills, 86-88 Franklin St, New York.
Eichmann & Sternberg, 530 Broadway, cor. Spring St, N. Y.
Germantown Spinning Co, Germantown, Pa.
Greene & Daniels Mfg. Co, Pawtucket, R. I.
Hyde, E. S, 223 Chestnut St, Phila, Pa.
Jenckes, E., Manufacturing Co, Pawtucket, R. I.
King, Alex, & Co, 54 Leonard St, New York.
Mitchell, James E, & Co, Phila. and Boston
Monument Mills, Housatonic, Mass.
New England Thread Co, Pawtucket, R. I.
Orswell Mills, Fitchburg, Mass.
Rockwell, E. M, Leominster, Mass
Sanford Spinning Co. Fall River, Mass.
Shimer, Geo, & Son, 5th and Erie Sts, Camden, N. J.
Skerry, A. T, & Co, 47 Leonard St, N. Y.
Walcott & Campbell Spinning Co, New York Mills, Oneida Co, N. Y.
Warren, W, Thread Works, Westfield, Mass.
Whittier Cotton Mills, Lowell, Mass.

Flax, Hemp, Jute and Ramie.

Burnet & Co., 24 George Sq., Glasgow, Scotland.
Eichman & Sternberg, 530 Broadway, cor Spring St., N. Y.
Fawcett, Hughes, 115 Franklin St., N. Y
Holland & Webb, N. Y.

Mohair Yarns.

Eichmann & Sternberg, 530 Broadway, cor Spring St., N. Y.
Goff, D. & Sons, Pawtucket, R. I.
Skerry, A. T, & Co, 47 Leonard St, N. Y.

Novelty Yarns, Tinsels, Silk Noils, Etc.

Burnet & Co., 24 George Sq. Glasgow, Scotland.
Cranston Worsted Mills, Bristol, R. I
Eichmann & Sternberg, New York City.
Indian Orchard Co., Indian Orchard, Mass.
Malcolm Mills Co, 229 Chestnut St, Phila, Pa.
Montgomery & Co, J. R, Windsor Locks, Ct.
Skerry, A. T, & Co, 47 Leonard St, N. Y.

Silk Yarns.

Cheney Bros, S. Manchester and Hartford Ct.
Eddy & Street, Providence, R. I.
Eichmann & Sternberg, 530 Broadway, cor. Spring St, N. Y.
Hawes, O. S, & Bro, Fall River, Mass.
Ryle, Wm, & Co, 54 Howard St, N. Y.

Woolen and Merino Yarns.

Boyer, B. F, & Co, 516 Market St, Philadelphia, Pa.
Clasgens, The J. & H. Co, New Richmond, Ohio.
Eddy & Street, Providence, R. I.
Hyde, E. S, 223 Chestnut St, Phila, Pa.
Jenckes, E. Mfg. Co., Pawtucket, R. I.
King, Alexander & Co, 54 Leonard St, N. Y.
Rockwell, Edward M, Leominster, Mass.
Skerry, A. T, & Co, 47 Leonard St, N. Y.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.

Worsted Yarns.

Alleghany Worsted Mills, Phila, Pa.
Botany Worsted Mills, Passaic, N. J.
Boyer, B. F, & Co, 516 Market St, Philadelphia, Pa.
Campbell, Geo, & Co, Phila, Pa.
Cranston Worsted Mills, Bristol, R. I.
Croft, Howland, & Sons, cor. Broadway and Jefferson Ave., Camden, N. J.
Eichmann & Sternberg, 530 Broadway, cor. Spring St., N. Y.
Elsasser, Albert R, Addingham, Pa.
Goff, D. & Sons, Pawtucket, R. I.
Herbst & Jones, 21st and Naudain Sts, Philadelphia, Pa.
King, Alexander & Co, 54 Leonard St, N. Y.
Phoenix Mills Co, 13 Letitia St, Phila, Pa.
Shimer, Geo, & Son, 5th and Erie Sts, Camden, N. J.
Skerry, A. T, & Co, 47 Leonard St, N. Y.
Solis, Andrew J, Jr, & Co, 179 Devonshire St, Boston, Mass.

Alphabetical Index to Advertisements.

	page
Adriance, John S.	147
Alexander Bros.,	171
Allegheny Worsted Mills.	136
Allington & Curtis . Outside Back Cover	
Altemus, W. W. & Son,	11
Amend Process Co.	145
American Express Co.,	166
American Glutrose Co,	153
American Napping Machine Co.,	152
American Silk Mfg. Co,	165
Am. Spinners' Cotton Yarn Exchange	130
American Supply Co.,	11
Anchor Color Mfg. Co,	144
Ardrey, S. B, & Sons,	164
Armitage Manufacturing Co,	138
Ashworth, Elijah,	10
Bamford & Smith,	152
Becker, Chas. W.	—
Beckley, A. J & Co.	148
Berlin Iron Bridge Co. Back Cover	
Berry, A. Hun,	150
Billington, J. H. & Co.	171
Bischoff, C., & Co.,	143
Blaisdell, P., & Co.,	173
Boss Knitting Machine Co,	163
Bosson & Lane,	146
Boston Finishing Works,	139
Boyer, B. F, & Co,	135
Bradway, C. P.	169
Branson Machine Co,	155
Breedon, Wm., & Son,	163
Brinton, H., & Co.,	154
Bristol Co., The . Outside Back Cover.	
Brooks, C. P.,	172
Brophy's, T, Sons	147
Brown, C. H, & Co,	171
Brown, W. H,	17
Buckley's Benj., Son,	12
Burnet & Co.	135
Butterworth H. W. & Sons Co.,	1
Caldwell, W. E Co.	150
Campbell, Geo, & Co,	136
Campbell & Clute,	164
Carr, Mfg. Co.	176
Catlin & Co,	131
Challenge Wind Mill and Feed Mill Co,	148
Channon, H, Co.	14
Cheney Bros,	138
Christiana Machine Co,	169
Clark, The William Co,,	134
Clasgens, The J. & H. Co,	123
Cobb, Thad. S, Machinery Co.	173
Cochrane Chemical Co.	139
Cohannet Mills,	135
Cohoes Foundry & Machine Co.,	11
Colchester Mills	133
Columbia Mfg. Co,	12
Cooper, Chas,	164
Corcoran, A. J,	150
Corey, S. J.,	146
Corey, Wm., Co.,	163
Crabb, Wm, & Co,	12
Crane Mfg. Co.,	154
Cranston Worsted Mills,	136
Crawford, J. J. & Son.,	—
Croft, Howland, Sons & Co,	136
Crompton & Knowles Loom Works, Outside Back Cover.	
Crosby & Gregory,	19
Crossley & Goddard,	19
Curtis & Marble Machine Co.,	152
Cypress Lumber Co,	148
Dalrymple, Geo,	168
Dana Warp Mill,	133
D'Este & Seeley Co.,	167
Denny, R. B.	120
Dillon & Co,	146
Dixon, Jos., Crucible Co.,	167
Draper Company	3
Dodge Needle Co.	—
Douglas Mfg. Co.	12
Eastern Machinery Co.	168
Eco Magneto Clock Co,	12
Eddy & Street,	135

	page
Eichmann & Sternberg,	133
Elgin National Watch Co,	13
Elliot & Hall,	12
Elsasser, A. B.	133
Employers' Liability Assurance Corporation, Ltd.,	17
Excelsior Knitting Machine Co,	137
Excelsior Sewing Machine Co,	163
Fairmount Machine Co,	10
Farbenfabriken of Elberfeld Company,	142
Fawcett, Hughes,	131
Fell, Geo., & son,	10
Ferguson, John W., . Outside Back cover	
Firth & Foster Co.	139
Flanders, E. A,	173
Fowles & Co.,	153
Frame, Gibbons,	164
Fresnel, Gustave P,	17
Friedberger & Co.	161
Furbush. M. A. & Son Machine Co,	20
Garfield Woolen Co.,	—
Gavey School of Design,	127
Geisenheimer & Co, Outside Back Cover.	
Germantown Spinning Co.,	130
Gerry, Geo. & Son,	—
Goff, D. and Sons	134
Goldstein, I	163
Goulds Mfg. Co,	—
Granger Foundry & Machine Co., Inside Front Cover.	
Grant Yarn Co.,	131
Greene & Daniels Mfg. Co.,	134
Greenwood, R., & Bault,	139
Haedrich, E. M,	147
Hadley Co.,	134
Haines, William S,	—
Hanna-Schoellkopf Co,	145
Hart, Chas.	—
Hartford Steam Boiler Inspection & Insurance Co.,	173
Harwood, Geo. S. & Son, Outside Back Cover.	
Hawes, O. S., & Bro.,	131
Hepner & Horwitz,	165
Hepworth, John W, & Co,	160
Herbst & Jones,	133
Hill, Jas., Mfg. Co.,	—
Holliday, Read, & Sons, Ltd,	146
Home Bleach & Dye Works,	139
Hopkins, A, & Co,	153
Hooven, Owens & Rentschler Co,	—
Howard, Geo. C.,	12-17
Howard & Bullough Am. Machine Co.,	7
Hunt, C. W.	15
Hunter, Jas, Machine Co,	151
Hunt, Rodney, Machine Co,	152
Hyde, Edward S.,	137
India Alkali Works,	165
Indian Orchard Co.	132
Ives, Loyal T.	163
Jaeck, The, Bros Co.,	146
Janney, O. S., & Co.,	143
Jefferson, Edw, & Bro.,	127
Jenckes, E., Mfg. Co.,	131-159
Johns, H. W. Mfg. Co.	20
Johnson, Chas. A., & Co.,	148
Johnson, Wm. G, & Co	140
Jones, Lewis	154
Jones, W. A, Foundry and Machine Co,	17
Keller, John J., & Co.,	141
Kennebec Woolen Mills,	12
Kennedy, Thos.	165
Keystone Knitting Machine Mfg. Co,	160
Kilburn, Lincoln & Co.,	10
King, Alex'r & Co.,	131
Klipstein, A, & Co., Outside Back Cover.—	145
Koechl, Victor, & Co,	140
Kront & Fite Mfg. Co.,	165
Lamb, Mfg Co.	156
Laminar Fibre Co,	17
Leffel, James, & Co,	169
Leigh, Evan Arthur,	11
Leighton Machine Co.,	157
Lincoln The, Co.	148
Link Belt Machinery Co.,	13

	page
Little Hustler Napper Co.,	165
Littlewood, G. J, & Sons	138
Lombard Water Wheel Governor Co.,	—
Loom Picker Co., Biddeford,	8
Lowell Machine Shop,	2
Lowell Textile School,	172
Lydall, H., & Foulds,	163
Lynn Incandescent Lamp Co.	167
Magnesia, Outside Back Cover	
Malcolm Mills Co.,	136
Manufacturers' Supplies Co.	163
Mason Machine Wks.,	5
Massachusetts Fan Co,	147
Massink, H.	19
Matheson, & Co., Wm. J.,	142
Mayo Knitting Machine & Needle Co,	158
McKnight, S.	153
McMichael & Wildman Mfg. Co,	159
Merrimac Chemical Co,	—
Merrow Machine Co.,	162
Mitchell Jas. E., & Co.,	131
Montgomery, J. R., Co.,	132
Monument Mills,	134
Moore, C., & Co.,	133
Mueller, A,	163
Mutual Boiler Insurance Co,	176
Nanz & Co,	17
Nashua Spool and Bobbin Co,	12
New Bedford Copper Co.,	148
New England Ventilating & Heating Co.,	147
N. Y. & Boston Dyewood Co,	140
Novelty Textile Printing Co,	147
Nye & Tredick,	154
Oakes Mfg. Co,	146
Orswell Mills,	132
Pawtucket Dyeing & Bleaching Co.	139
Paxton & O'Neill,	162
Pearson, J. T.,	164
Pepper Mfg. Co.,	157
Phenix Iron Foundry,	148
Philadelphia Textile Machinery Co.,	9
Philadelphia Textile School,	172
Phillips & Anderson	19
Phillips, The Thomas, Co,	176
Phoenix Mills Co.	137
Pickhardt & Kuttroff,	18
Planters' Compress Co,	16
Pownall, F. H, Iron Works,	164
Quilter, James H,	172
Revere Copper Co,	150
Riverdale Woolen Co,	153
Robertson, J. L. & Sons,	120
Rockwell, E. M.,	133
Roessler & Hasslacher Chemical Co,	143
Ryle, William, & Co.,	138
Saginaw Mfg. Co.	168
Sanford Spinning Co.,	130
Sargent's, C. G., Sons,	—
Scott & Williams	156
Sharpless Dyewood Extract Co.,	146
Shimer, Geo, & Son	137
Skerry, A. T, & Co,	137
Solis, Andrew J. Jr., & Co.,	134
Stafford & Holt,	169
Stamford Mfg. Co.,	144
Standard Machine Co.,	160
Stearns, A. T, Lumber Co,	149
Stein, Hirsch & Co.,	145
Stillman-Randall Machine Co.,	153
Stockwell & Ensor,	171
Stoddard, Haserick, Richards & Co,	8
Stohn, C.	165
Stone & Ware Co,	145
Sturtevant, B. F. Co., Inside Back Cover	
Sullivan Machinery Co,	173
Sykes & Street,	144
Taylor, James,	162
Thomas, N. Spencer, Co,	145
Thurston, A. G. & Son,	—
Torrance Mfg. Co,	—
Townsend, Thos,	12
Treat, Orion,	165
Tucker & Cook Mfg. Co.,	131
Universal Winding Co.,	128
Walcott & Campbell Spinning Co,	135
Walder, J.,	11
Ward & Vandergrift,	12
Wardwell Needle Co.,	163
Warren, W., Thread Works,	130
Watson, L. S, Mfg. Co,	11
Webster Dye Works,	147
Weimar Bros,	165
Whitcomb, H. C, & Co,	17
Whitin Machine Works,	4
Whitinsville Spinning Ring Co.,	10
Whiton D. E. Machine Co.,	173
Whittier Cotton Mills,	132
Wildman, Joseph, & Co,	147
Witmer, D. L, & Bro,	165
Woolford, George,	150
Woonsocket Machine & Press Co,	6
Woonsocket Napping Machinery Co,	153
Wright, Brown & Quinby,	19
Yerrington, F. M,	—
Young, Wm. M,	163

IF YOU **HAVE LEAKS** in your STEAM PLANT you can make them less by using EUREKA PACKING. If your engine HAMMERS, or their is OIL in the BOILER, the HINE ELIMINATOR will remedy both troubles. SEND FOR CATALOG.
Jas. L. Robertson Sons, 215 Fulton St., N. Y. 12 Pearl St., Boston.

MILLS FOR SALE! Woolen Mills and other manufacturing plants. Agent for Sale of Mill Properties.
R. B. DENNY, 143 Federal St., BOSTON, MASS.

SITUATIONS WANTED.

The advertisers in the following columns should be addressed in care of TEXTILE WORLD, or inquiries concerning them may be addressed directly to "Information Department, TEXTILE WORLD," as full particulars of each advertiser are on file, and the addresses of suitable agents, superintendents and foremen for every branch of the textile industry will be furnished to manufacturers.

Any subscriber may file his application, and no charge is made until position is secured.

The business of this department is held strictly confidential.

The applications of good overseers in every department, who are in want of positions, are solicited.

Manufacturers are invited to use this department when in need of skilled men; each case will be handled confidentially, with promptness and judgment, and without charge to manufacturers.

A member of the firm is in charge of this department, and gives personal attention to each case.

WOOLEN SUPERINTENDENTS.

1349 **Woolen Supt. or designer.** Has been 12 years superintendent of 20 set mill in Conn., until recently, when he resigned on account of children's schooling. Has also been designer and pattern weaver. High character and first-class ability. Age 39; American, married. Experience on worsteds, cassimeres, cheviots, ladies' fancy dress goods, etc.

1387 **Woolen Superintendent,** one who has had a thorough practical experience in setting up and operating woolen mills. Would take charge of small mill or finishing department in large mill. Now employed but wishes to change. Correspondence solicited.

1305 **Superintendent and Designer** with 20 years' experience in woolen mills, on cassimeres, cheviots, worsteds and cloakings. Is now out of employment. Wants position at once.

1268 **Woolen** superintendent or designer. First-class experience in England and America. A first-class man in every way; age 34; married. Fancy worsteds, cheviots, novelty goods, cassimeres, overcoatings, cloakings, dress goods, piece dyes, worsteds and cheviots.

1250 **Superintendent,** or would accept a position as designer in a good woolen mill. Understands fancy cassimeres, cloakings, dress goods, kerseys, unions and worsteds. Can produce the Jacquard effect on an ordinary cotton, Knowles loom. Refers to good mills.

1398 **Woolen Superintendent or Designer** of recognized ability and at present employed as a superintendent of 36 set woolen and worsted mill. He finds it necessary to remove from New Jersey on account of his wife's health. His past record is first-class and this is an unusual opportunity to secure the services of a first-class superintendent.

1386 **Woolen Superintendent and** Expert Carder. With experience in both positions. A man of skill and push, now out of work through failure of mill, caused by outside speculation by one of the firm. Age 43; married; Yankee.

935 **Woolen Supt. and Designer.** Graduate of German Textile School. Has managed successfully two mills in the West. Thoroughly up on designing and general mill management. Age 35. Married. References first-class.

1408 **Carpet superintendent.** Has had management of Phila. and N.J. mills making damask, ingrain, axminster and Smyrna carpets and rugs. Also chenille curtains. 14 years as overseer, 6 years superintendent. Age 42. Married. Refers to mills where he has worked.

COTTON SUPERINTENDENTS.

1337 **Assistant Superintendent.** Expert on book binder's cloth, window shades, fan cloths, friction callender machines. 20 years with Wilson & Bentleys, London, and about 2 years employed in this country. Age 45, married. American and English references.

1332 **Supt. with long experience** in both Northern and Southern mills. Has started 3 Southern mills, on print cloths, broad and narrow sheetings and fine shirtings. First class references from all past positions. Age 48. Might accept position as overseer of large weave room.

1265 **Superintendent** wants position as superintendent of cotton cloth mill. Has had charge of each department in the mill; aged 28 years; married.

1266 **Cotton** superintendent wants position. Out on account of mill shutting down. Understands fancy and plain cottons, white and colored. Has a first-class record.

1306 Young American wants position as cotton superintendent. Experience mostly on cotton warps. Has been bookkeeper, overseer of carding and spinning; also superintendent in Massachusetts mills.

1184 **Cotton Mill Superintendent,** wants position. Age 50; married. Sheetings, shirtings, drills, etc.; also all kinds of yarns and yarn dyeing. Has good references. Superintendent eighteen years at one mill.

578 **Cotton Superintendent** with experience as boss carder, master mechanic and superintendent on prints, sheetings, twills and sateens. An American of high character, and whose ability is proved by past record. Age 35, married; can accept position at once.

1390 **Cotton Superintendent.** Especially qualified for a mill making dress goods and fine shirtings. Experience with first-class mills as designer and manager. A young man of high character. At present employed.

1269 **Cotton** superintendent, carder, spinner and dresser; 48; married. Has held position in some of the best mills; is strictly temperate, and well recommended. Cotton, flannels, ginghams, crochet and Marseilles quilts, etc.

1236 **Supt. of Cotton Mill** desires to change position. Is thoroughly competent, steady and reliable. Good mechanic, manager, push and executive ability. Over 15 years experience, and fully understands how to keep production right as to quantity, quality, and lowest cost. Best system of economy maintained. First-class references can be given.

WOOLEN CARDERS.

1082 **Woolen carder experienced on** all classes of underwear. Has worked for eight years in one mill, 29 years of age and married. Good references.

1190 **Woolen** Carder or Spinner. Age 47; married. One reeler and one piecer in family. Has been overseer and spinner for the last fifteen years for one firm, which is now out of business. Refers to past employers. Can take position at once. Familiar with wool shoddy and cotton; Furbush, Lee and other makes of machinery.

1378 **Overseer Woolen Carding.** American, age 32, married. With one mill 13 years, and another 4 years. Excellent references from each. A first-class carder in every way.

1367 **Boss Carder** of wool, shoddy, or cotton. More than 12 years experience as boss carder in leading knitting mills in N. Y. At present employed but desires to change for $3 00 a day or better. Can take charge of mule spinning also. Married; age 36; American.

1286 First-class Carder, now employed, wishes a better position. Has the best of references from good mills. Excellent manager of help. Age 35; married. Experience on broadcloth, dress goods, covert cloth and meltons.

1270 **A 1 Carder,** wool or cotton, 11 years experience, first-class references, reliable, temperate and industrious, desires immediate position. Age 30. Will go any where.

1307 **Carder** with unusually fine record and very wide experience desires good position in New England, Central or Western States. First class references from past positions. Age 44. Experience on cassimeres, cheviots, dress goods, broad-cloth, repellants and blankets.

COTTON CARDERS.

1403 **Cotton Carder** with 17 years experience in N. E. mills as overseer and second hand, now in the South but wants to return North. Has never worked for less than $3.00 but would take $2 50 to change. Married. Age 38. Best of references.

1339 **Cotton Carder,** young man holding first-class position in New York State, would like position in Eastern or Middle States as assistant superintendent or boss carder paying $5.00 or more a day. Is worth that salary; experience and references of the best.

1368 **Overseer on Second-Hand Cotton** Carding wants a position in small room at $2.50 per day or upwards. Will do his own grinding. Or, would take a first-class second hand job. Last five years in one place. Thoroughly practical and understands all the machinery in the card room. Age 37; married. Good reference. Prefers New England.

1384 **Second Cotton Carder.** Energetic student at Lowell Textile School wants position in a mill until Oct. 1st 1898. Only expects enough pay to cover living expenses. A bright young man not afraid of hard work.

1315 **Cotton Carder.** Over 20 years' experience as overseer in first class mills. At present employed. Well up on prints and light and heavy sheetings. Knows American and English cards, and speeders. Best references.

WOOLEN SPINNERS.

1299 Woolen Spinner who has had experience as second-hand would like a position as boss spinner. Would accept small salary to start. Has worked on cloakings, dress goods and Scotch tweeds in New England mill.

1287 **Young Man** wants position as boss spinner. Experience in first-class mills on cassimeres, kerseys, cheviots, satinets; knows Davis & Furber, Paul and Johnson & Bassett machines. Age 29. Wife works in mill.

1195 **Spinner, Woolen.** American; age 31; married. Experienced on yarns from 1 to 7 1-2 run. Refers to past and present employers. Wants position as overseer. Will not go to Southern States, Canada or Connecticut. Is an experienced overseer.

1374 **Overseer Woolen Spinning.** All makes of mules, has had charge in good mills. Experience covers yarns for hosiery, fancy woolens and worsteds. Age 28; married.

633 **Woolen Spinner,** now overseer in good mill, wants to change on account of wife's health to N. E. or Western states. 9 years experience as boss in good mills. Would start for $2.50 a day. Age 37. First-class references.

1204 **Situation wanted** as boss spinner, or second hand and mule fixer on Plain mules. Many years experience on yarns for dress goods in England, and also yarns for fine woolen cloth. 35 years old and married; good references.

1316 **Overseer Worsted Drawing** and spinning. Will accept first class position at $3 or more per day. At present employed in well known and first class mill. Age 42. Married. Best references from former employers.

COTTON SPINNERS.

1424 **Overseer, Spinning.** Mules preferred. At present employed in N. B. mill. Has held position as overseer 6 years. Single. Will go anywhere.

1407 **Cotton Frame Spinner** now in charge of nearly 20,000 spindles in a Southern mill wants to return north. First-class reference both north and south where he has worked. Age 30. Married. American.

1272 **Second Hand** of cotton ring spinning wants position in Massachusetts, Rhode Island, Maine or New York. Age 23; married.

1364 **Cotton Spinner, mules or frames** Early training in England, 5 years in New England mills, yarn 20s to 120s. Because of misfortune would accept second hand job. Excellent reference for character and ability. Age 32, married.

1350 **First-Class Ring Spinning** overseer, also spooling, warping, slashing, web drawing; large experience, highest references as to skill, character and executive ability. At present employed in Fall River. Age 48, American.

1198 **Cotton Spinner,** spooling, warping, slashing, web drawing, skein winding and quilting on linen. Well recommended. Age 42; married. Has worked in some of the best mills. Will go anywhere. Would accept a good second hand's position.

WOOLEN WEAVERS.

1340 **Worsted Weaver** would like position in a small mill at moderate salary; experience as fixer and in cloth room. Age 38, married. Knowles and Crompton looms; references good.

1099 **Woolen Weaver** with large experience with Crompton & Knowles looms on dress goods, cassimeres, unions, worsteds. Highly reccommended. Age 41. Married

1099 **Woolen Weaver** on dress goods, cassimeres, unions and worsteds. At present out of work because of mill shutting down. Has an excellent record and refers to well-known men. Willing to start on moderate wages. Age 41; married.

1385 **Worsted or Woolen Weaver** of fancy worsted and woolen mens' wear and novelty dress goods. Has held positions in leading N. E. and Phila. mills. Expert on Crompton & Knowles looms: Best references. Age 38; married. Can start at once.

1313 **Woolen Weaver.** First class references, and experience on fancy cassimeres, kerseys, beavers, dress goods, etc. At present not employed, for good reasons. Age 44. Married.

140 **Worsted Weaving Overseer** with 12 years' experience as overseer, designer, and superintendent. Has tried another business for a few months and now wants to go back to the mill. Excellent references, habits all right. A skillful weaver and manager. Age 33, married, American.

COTTON WEAVERS.

1425 **Overseer, Cotton Weaving** Age 38. Married. At present employed in large Mass. mill where he has been for 7 years as overseer. Worked on all kinds of goods and is well experienced. American. Refers to past and present employers.

1380 **Overseer Cotton Weaving.** Held overseer's position for 5 years in Mass. mill, but now out because of change in management. A man of well-known ability. Age 48; married, American. One of the best weavers in New England. Will go South to a good position.

1373 **Overseer Cotton Weaving.** A man with especially good opportunities to gain wide experience in large Mass. mills; now second hand, having worked up from hand boy. American, age 29, married; best of references.

1392 **Cotton Weaver,** with first-class record in R. I. mills, desires to change for position paying $2.50 or more. Experienced on sheetings, lawns, sateens, twills, etc. Excellent references. Age 35, married.

1353 **Overseer Cotton Weaving,** who has worked up from fixer to overseer in good mills, wants position paying $3.00 or more. Scotch, age 29; experience on all kinds sheetings and sateens.

1334 **Jacquard and Dobby Weaver** and designer on Knowles machines. 8 years' experience in this position. At present employed and can furnish excellent references. Age 38; married.

1333 **Overseer of Cotton Weaving** with more than 20 years' experience in weave rooms of N. E. and Canadian mills. Experience on all kinds of white and colored, plain and fancy work, except Jacquard, American and English, looms. Married; age 37.

1409 **Cotton Weaver.** An exceptionally good man on prints, light and heavy sheetings. His mill has shut down and he desires to move to South. Very highly recommended. Age 40. Married. American.

DYERS.

1415 **Dyer.** Now out of work on account of the mill being stopped. Aged 30, and married. Will start for small pay. Accustomed to Beavers, Broad and Carriage cloths, Repellents, fancy Cassimeres, Raw Wool and Cotton, light shades or piece dyes. Refers to past employers.

1420 **Dyer.** 22 years experience dyeing wool and Cotton Hosiery. A first class man.

1426 **Dyer,** silk or cotton. Age 45. Married. Italian. Learned trade in France Has worked 23 years in this country in good mill Refers to past employers.

1427 **Second Hand Cotton Piece** Dyer. Age 38. Married. Worked on canton flannels, sateens, drills, ducks and all kinds cotton piece goods. Was 12 years in one mill as second hand. At present employed but can leave at once. Well recommended.

1354 **Dyer of Large Experience** both in woolen mills and in job dyehouses. A man of far more than average skill from raw stock to piece dyeing, dress goods, etc. Scotch, married; age 39.

1355 **Wool and worsted Dyer,** a young man with 5 years' training by one of the best dyers at one of the largest mills in N. E. Experience on worsted and woolen cheviots, clays, worsteds, suitings, cloakings, beavers, dress goods, carriage cloths, yarn, slubbing, wool. Would be able to take charge of small high grade small plant.

1361 **Wool Dyer and Finisher,** large experience on blankets, all kinds of flannels, felts and dress goods Early training in Scotland, 15 years in this country. Now employed, but wants to locate in the North near the sea. Age 40, married; now giving entire satisfaction.

FINISHERS.

1351 **Woolen and Worsted Finisher** with 7 years' experience as overseer in R. I. and N. Y. mills, from which he has excellent references. At present second hand in one of the best worsted mills in N. E. Habits first-class; age 29, married.

1359 **Woolen Finisher** of all kinds of woolen goods; 20 years in charge, at three leading mills. At present out of employment; expects $4.00 a day. Age 45, married; references first class.

1330 **Expert Finisher** with 10 years' experience in European mills. Can do perfect work on highest grade cassimeres, serges, cheviots, kerseys, worsteds, astrachans. Age 34; married. German, speaks English imperfectly.

1376 **Finisher** of all grades of woolens and worsteds, wet or dry. 8 years experience in England and 6 years in this country. Now employed as overseer but wants to change location. Age 30; married.

1396 **Wool Finisher.** This man has had a very large experience among well-known mills and refers to past employers. Character and ability of the first order.

1400 **Underwear Finisher** or Assistant Superintendent. Has worked up from brusher boy to assistant superintendent in first class N. Y. mill. Experience covers flat and ribbed goods. D. & F. cards and jacks. Union Special, Singer and Wilcox & Gibbs Sewing machines. American. Age 26. An energetic, smart young man.

KNITTERS.

1419 **Superintendent** or carder in knitting mill. All kinds from 8 to 36 gauge, also fine cloths. Aged 42. Married. 2 boys, rib knitters. Refers to past employers.

1402 **Circular Rib Knitter** now holding position as overseer in N. Y. mill would like to secure better position. Has worked on spring needle and welt work silks, worsteds, cotton, tuck stitch ladies' forms. Can refer to present and past employers. Age 24. American.

1401 **Boss Knitter** at present employed but wants to change. Experience on plush, cotton, and wool. 10 years as second hand previous to present position as overseer. Age 30. Married.

1405 **Boss Knitter.** Young man with good knowledge of knit goods. At on circular ribbers. Thoroughly experienced on mittens, leggings and golf hose. owns 3 machines. Can bring best of references from large concerns. Desires position with good house.

1410 **Knitting Machine Fixer.** Young man who wants to gain large experience in this line desires a position in the Eastern or Central states. Is expert on many kinds of machines. Leggings, bicycle hose, gloves, mittens, etc. Highly recommended as to character and ability.

1362 **Boss Rib Knitter,** young man, now second hand in fleece lined underwear mill in New York State wants to advance. Very highly spoken of by present employers as to both ability and character. Could change on short notice.

1342 **Hosiery or Underwear Supt.** A practical knitter familiar with latch, spring needle, and sewing machines; nearly 15 years superintendent of New England hosiery mill, at present shut down. Good manager; references first-class. Age 47; married.

1391 **Boss Knitter** who has the very best references. Now employed but wants more pay. Would change for $3.50 a day. Experienced in both hosiery and underwear. Age 32; married, American.

DESIGNERS.

1411 **Assistant Supt. or Designer** desires position. Thoroughly practical, having had experience from picker to loom in one of the best N. E. mills. Has designed both single and double cloths in cotton, woolen, worsted and silk. Good references.

1259 **Woolen Designer or Supt.,** 10 years' experience on meltons, kerseys, beavers, and dress goods. Thorough knowledge of color mixing and picking out. Best of references from past positions. Age 39, single.

1397 **Cotton Designer or Weaver.** A young man with unusual opportunities and experience in England, now holding a position in a leading mill in Connecticut, desires to advance. Refers to several prominent mill men and would make a progressive designer for a mill running on Jacquards, Lappet or Lenos.

1383 **English Woolen Designer.** 20 years in leading Yorkshire and Huddersfield mills as designer, supt. and weaver. Very large experience and would accept moderate salary in good mill. Age 36; married, English.

1275 **Designer** or assistant. Age 25; married. A good man on cotton or worsted fancy dress goods. Jacquard and box looms.

1252 **Designer, Weaver or Dresser.** Aged 40 years; married. Familiar with nearly all kinds of men's wear, piece dyes, etc. Refers to past and present employers.

MISCELLANEOUS.

1423 **Carpet** Mill Overseer. Aged 38. Married. Refers to good and responsible parties. Has held positions in some of our best mills, and has a thorough knowledge of weaving of Brussels, Milton and other carpets.

1418 **Cloth Hall.** Overseer, shipping clerk or paymaster. Has had a thorough experience in each of the above positions and is familiar with white and colored cotton goods. Is well recommended. Aged 35. Married, and is also a good all around accountant.

1365 **Assistant Supt. Underwear** Mill. Experience mostly on flat goods, is an expert bookkeeper, understands making cheap goods, finishing, and general knowledge of machinery. Moderate salary. Age 39, married, American.

1301 **Book-keeper and Paymaster.** Young man of the very highest character desires to move away from the Atlantic coast, on account of his health. Best references from his present and former employers.

1393 **Practical Chemist.** Experience covers three years in English and German textile schools and 17 years in New England mills, bleacheries and print works. Has practical knowledge of all departments of a bleachery, and would accept position in the South. Age 39; married; American.

1381 **Cloth Examiner.** Worsteds or woolens. German, age 50, single. Man of high character, 9 years in one of the leading N. E. mills and also in large N. Y. clothing houses. Best of references.

1395 **Overseer of Slashing, Spooling,** warping and dressing, a man who thoroughly understands his business and has excellent habits, well recommended from leading mills. Age 42; married, English.

1379 **Overseer, Cloth Room.** Out of work because of change in management. A man with first class record and wide experience. Refers to several prominent mill men. Age 39; married, American.

1335 **Loom Fixer or Second Hand.** Knowles and Crompton looms, fancy worsteds and cassimeres, dress goods. German; Protestant; age 37, married. Has been employed in good mills and is very well recommended.

1372 **Wool Sorter.** Young man with excellent training in R. I. mill. Will start at $2.00 a day. Refers to past employers.

1312 **Overseer Dresser.** Age 34. Married. Is at present working in a first class mill. Desires to change because of poor health of family. Can furnish first class references. Cassimeres, unions, woolens.

1363 **Twisting, Spooling, Warping** overseer. Experience on single and twisted yarns up to 2/100s in one of the best New England mills. Now employed as assistant; young man, but is confident that he could satisfactorily fill overseer position.

1399 **Master Mechanic** with experience from bench work up to foreman. Has worked in cotton mill and cotton machinery works. First-class workman. Can get the best results from power plant and machinery.

1404 **Chief Engineer and Machinist.** A man who is fitted by education and experience to take charge of a large plant. Well acquainted with all kinds of mill machinery. Has hadcharge of erection of steam, water and electrical plants, pumping machinery and cotton mill equipment. Would be an excellent man to superintend the erection of a new plant and economical operation of same.

Eastern Yarn Market.

(Concluded from page 135.)

flicting the statements of the spinner, as against the weaver may be, everything shows that many orders for serge, cheviot and dress goods yarns in one-fourth and one-half blood, have been placed and the spinners are stiffening up prices; and well they may, for this class of wool is all in the hands of speculators or worsted spinners. The spinners are holding for an advance on yarn and the speculators are willing to sell only at a price which is two cents per pound less than the import price of 27½ to 28 cents in the grease. If this price is maintained on the wool, this class of yarn must advance from five to seven cents per pound. This wool is as near the importing price as wool has reached so far. We note in connection with serges and cheviots that weavers are using single yarn in the place of two-ply. Instead of using 2/20s, 1/10s are used, and so on. This is a piece-dye year and also a worsted year. We hear it predicted that inside of six months three-fourths of the woolen mills will be shut down while the worsted mills will be more than busy. Light-weight samples have been opened; the serges and cheviots are selling well; the fancy worsteds in fine yarn are doing nothing. The expectations are great for cotton fancy worsteds, but orders are coming slowly and we note that there are additional mills who previously sold nothing but all-worsted goods are going on to cotton worsteds. Let us get this great yarn speculation deal straight and then we can leave it forever. There was purchased 1,200,000 pounds of yarn of four spinners. The yarn was bought in two lots at two different times. For the first was paid $1.00 per pound. The cheapest prices paid were 95, 90 and 85 cents. The syndicate, we hear, is offering the cheapest lots first, and is selling at 85 cents. All the manufacturers agree that this amount of yarn will take a long time to dispose of and that the syndicate must wait a long time before realizing a profit. The light-weight season on regular lines is a failure. Rockville mills and the Utica mills, manufacturing fine worsteds, have opened their lines, but have received very little attention at the hands of the buyers. These mills have been running but four days per week, with part machinery, and there is no immediate prospect of better business. The trade continues to call for a cheap cloth, hence serges have been run by the side of cotton-worsteds. The buyers of light-weight cloth are all holding off and many will not buy at all. The West has been sending in some good orders, but New York and the Eastern market are dull and will not buy until later. The commission merchants are a very discouraged lot of men. They depend upon commissions for a living and are under heavy expense. Their salesmen go out and instead of securing decent orders, can only get one or two piece orders of a style. One large concern which should have secured 5000 pieces have only taken orders for 500 pieces up to August 15th. Of course the wet and cold spring had much to do with the present light-weight season, as light-weights, which should have been sold in May and June, are still on hand and cheap serges have taken their place to be sold during the months of July and August. Serges are easily and quickly made, and have not been beneficial to the manufacturer, because every one can make them, and the style of the garment does not count. We hear some very interesting statements regarding cotton-worsteds. These garments when once wet make a very uneven and unsightly garment. The half-wool fabrics, that is fifty per cent. worsted and fifty per cent. cotton, look worse than all-cotton.

We quote:

WORSTED YARN.

All Australian, 2/40s, $1.00; 2/50s $1.05; Half delaine, half Australian, 2/40s, 95 cents. Half blood, 2/40s, 82½ cents. Three-eights to half blood serge yarn, 2/36s, 70-72½ cents. Three-eights blood, 2/20s, 65-66 cents. Good quarter, 2/14s, 59½ to 62 cents.

From what we hear the consumer will get educated up to better cloth, even if 50 to 100 per cent. more must be paid for the cloth. Knitters using Frence spun yarn believe in an advance in the close of yarn next year, and are placing orders now for future delivery. Manufacturers using this class of yarn covered themselves last year to anticipate an advance, and they must do the same thing again.

Patents.

(Continued from page 22.)

Hackling Machine. 608,980. John Good, New York, N. Y., assignor to Julia E. Good, same place.

Harvester, Cotton. 608,689. George S. Lee, Hawthorne, N. J.

Humidifier. 607,970. Richard C. Ulbrich, Boston, Mass., assignor to William Firth, same place.

Knit Fabrics, Machine for Uniting. 608,626. Jacob H Secor, St. Joseph, Mich.

Knitting Machine. 608,040. Andrew V. Groupe, Moore, Pa., assignor to James L. Branson, Philadelphia, Pa.

Knitting Machine, Circular. 607,853. Thomas J. Holton, Philadelphia, Pa.

Lap Machine, Exhaust Opener. 609,155. Thomas R. Marsden, Oldham, England.

Loom. 607,838. William F. Draper and James H. Northrop, Hopedale, Mass., assignors to the Northrop Loom Co., same place and Saco, Me.

Loom. 607,937. Charles A. Littlefield, Lowell, Mass., assignor to the Draper Co., Portland, Me.

Loom. 609,156. John T. Meats, Taunton, Mass., assignor to the Mason Machine Works, same place.

Loom. 609,257. Horace Wyman and Randolph Crompton, Worcester, Mass., assignors to the Crompton & Knowles Loom Works, same place.

Loom, Circular. 608,676. Josef Herold and Carl Herold, Brunn, Austria-Hungary, assignors to Rundwebstuhlfabrik, Herold & Richards, same place.

Loom for Weaving Looped Pile Fabrics. 608,226. George H. Sargent, Richard H. Coupe and Benjamin Walker, Bingley, England.

Loom Shuttles, Filling-Carrier or Cop Skewer for. 608,988. Charles A. Littlefield, Lowell, Mass., assignor to the Draper Co., Portland, Me. and Hopedale, Mass.

Looms, Jacquard Machine for. 608,037. Henry Glorieux, Roubaix, France.

Looms, Jacquard Machine for. 607,945. Fritz Muhlinghaus, Barmen, Germany.

Looms, Picker Staff for. 608,542. Joseph F. Benoit, Sanford, Me., assignor of one-half to George B. Goodall and Herbert J. Hope, same place.

Looms, Selvage Motion for. 607,985. Willie E. Cutler, Lewiston, Me., assignor to the Draper Co., Portland, Me, and Hopedale, Mass.

Looms, Swivel Batten and Shuttle for. 608,816. Ralph Whitley, Paterson, N. J. assignor of one-half to Joseph Fairhurst, same place.

Looms, Take-up Mechanism for. 609,272. George Goodline, Paterson, N. J., and Horace Wyman, Worcester, Mass., assignors to the Crompton & Knowles Loom Works, Worcester, Mass.

Looms, Warp Stop Motion for. 608,558. James H. Northrop, Hopedale, Mass., assignor to the Draper Co., same place an Portland, Me.

Looms, Warp Stop Motion for. 608,971. William E. Allen, Salem, Mass., assignor to the Draper Co., Portland, Me. and Hopedale, Mass.

Looms, Warp Stop Motion Mechanism for. 607,947. James H. Northrop, Hopedale, Mass., assignor to the Draper Co., same place and Portland, Me.

Mercerizing Apparatus. 608,194. John T. Greenwood, Philadelphia, Pa., assignor to himself, Daniel R. Greenwood, Horace T. Greenwood and William Bault, same place.

Shuttle Binder Spring. 608,038. Albert A. Gordon, Worcester, Mass., assignor to the Crompton & Knowles Loom Works, same place.

Spindle and Bearing. 608,992. Ludger A. O. Nichol and Eugene Ayotte, Lowell, Mass., assignors to the Draper Co., Portland, Me. and Hopedale, Mass.

Spindle Bearing 608,976. George O. Draper, Hopedale, Mass., assignor to the Draper Co., same place and Portland, Me.

Spinning Frame. 608,731. James P. Tolman, Newton, Mass., and Henry D. Martin, Shirley, Mass., assignors to the Sampson Cordage Works, Boston, Mass.

Spinning Machines, Stop Motion for. 607,864. Fred. Lacey, Valleyfield, P. Q.

Spooling Machine. 608,713. John Raistrick, Jamestown, N. Y.

Wool Drying Apparatus. 608,385. George Stone, No. Andover, Mass., assignor to M. T. Stevens & Sons, same place.

Yarn, Apparatus for Stretching while Mercerizing. 608,033. John R. Ecob, Lawrence, Mass.

Hosiery Mill For Sale or To Let!

A new plant, capacity 100 dozen per day.

Water Power To Let, 400 H. P., with excellent buildings.

W. K. DANA, Westbrook, Maine.

Wanted.

Weaver Foreman in Matting and Bagging Factory. Must be experienced, good habits, and reliable, and about 30 years of age. State qualifications and wages expected. Address WISCONSIN GRASS TWINE CO., Oshkosh, Wis.

Wanted.

I want to buy second-hand Crane Knitting Machines, twenty and thirty inch; one Curtis & Marble Napper; and George Payne & Company's Winders. Address,

P. 1 5, care Textile World.

Expert German Finisher Wanted.

A man who is thoroughly acquainted with German finishing machinery and German finishing methods. Prefer one with a thorough knowledge of machinery. One who can operate as well as design and furnish information. Address in confidence,

G. F. care of Textile World.

The Administrators of the Estate of Edward C. Thayer offer

FOR SALE THE FOLLOWING PROPERTY

In Ashuelot and Winchester, New Hampshire.

Mill No 1.

Mill No. 1—Main building 164x40 feet, brick, four stories; ell 84x28 feet, wood, three stories, dry finishing room and machine shop 116x20, brick; engine room, blacksmith shop and steam gig room 40x24, brick; dye house and drying room, 80x36, brick. All the above rooms are connected and contain the following machinery: Nine sets of cards 48-inch Lombard make; two sets cards 48-inch Cleveland make; finishers of cards all 60 stands; the best improved apron condensers, Davis & Furber and Barker make; clothing all in good condition and best quality. The first breakers are all equipped with Bramwell feeds, mostly new, two traverse and one cylinder grinder.

Spinning Room. Nine Davis & Furber self-operating 300-spindle each mules; two mules, Johnson & Bassett make, 400 spindles each.

Weave Room. Fifty-six full fancy Crompton looms and one pattern loom.

Finishing Room. Two finishing shears, Parks & Woolson make; two cropping shears, Parks & Woolson make; six fulling mills, Orange make; two fulling mills, flange rollers, Adams make; four washers, four strings each, Orange make; eight single-acting gigs, four double-acting gigs; one net gig and two steam gigs, Orange make; one cylinder press, Woonsocket make; one cloth-measuring machine, Windle make; one folding and rolling machine, Windle make; two brushes.

One engine, Corliss make, 80 H.P.; machine shop, with turning lathe and blacksmith shop, all complete. Above machinery operated by two independent water wheels, one six feet in diameter and one five feet in diameter.

Dye House (Brick). Five coloring kettles; three four-string washers with ventilating fan; two extractors, Boston Tool Co. make, all complete; extra four-foot Hunt wheel. Picker house (wood) 40x24, three pickers, one lumper, two dusters, extra four-foot Hunt wheel. Carpenter shop (wood) 40x30, two stories, equipped with planers, jointer, bench and swing saws and extra wheel. Boiler house (brick) 48x30, three boilers, one five-foot steel almost new, two four-foot tubular, all Cambridge make. Store house (brick) 100x40, four stories. Dressing room, three dressing machines, four spooling machines, all Cleveland make. Office (brick) 34x20. Store (wood) 100x26. Storehouse near railroad, 90x30. One brick boarding house, furnished; one four-tenement brick block; one four-tenement wooden block; nice residence for superintendent; 20 houses containing 38 tenements; two wood lots, one mowing and one pasture. Also dam, water privilege connected therewith, grist mill and blacksmith shop in Winchester. All above machinery in excellent condition.

Mill No. 2.

Mill No. 2. Main building (wood) 82x25, two and one-half stories, containing four sets machinery; lap cards, three sets, Lombard make, one set Cleveland make; forty-eight inch breakers and forty-inch finishers. Spinning capacity five self-operating spinning frames, Johnson & Bassett attachment; three 240-spindle frames and two 200-spindle frames. Finishing room (wood) 40x35 feet, two stories, contains one finishing shear, one cropping shear, one brush, one cylinder press, seven gigs, three fulling mills, two two-string washers, one four-foot Hunt water wheel and one four-foot tubular boiler. Picker house (brick) 46x26. One Kitson picker, one lumper, one duster. Office, 20x20; storehouse, 50x20; one boarding house; five tenement houses, containing eight tenements; weave room with 25 plain looms, Davis & Furber make. Plant for gas lighting, Springfield make; electric clock system for watchman; four writing desks in office; one set of hay scales, Fairbanks make, sprinklers and all fire apparatus in excellent condition. Further information will be furnished to parties desiring the same upon application to Rodney Wallace, Fitchburg, Mass.; or A. T. Batchelder, Keene, N. H., administrators, and parties desiring may inspect the property, without conferring with the administrators, upon application to the party in charge of the mills at Ashuelot, N. H.

EDWARD JEFFERSON & BRO.,

Worsted .·. Machinery,

28 Strawberry Street,

PHILADELPHIA, - - PA.

SOLE AGENTS FOR

J. B. Farrar & Sons, Halifax, England,

Buggella Cork Rollers for Spinning and Drawing.

MACHINERY

Shafting, Hangers, Pulleys and Couplings. Machinery Steel in all sizes from 6 1-2 inches diameter down to 3-16 inch diameter, cut any length, always in stock. Cold Rolled Rounds, Squares, Flats, Hexagons, Octagons, Decagons, and all shapes finished to exact sizes. Everything in readiness to be shipped at once. Our goods are without a rival and our prices the lowest of all.

Telephone 314, South Boston.

COMPRESSED STEEL SHAFTING WORKS,

South Boston, Mass.

WM. SLADE CLARK,

Manufacturers' Agent,

702½ Girard Building,

Broad and Chestnut Sts.,

Accounts Solicited. PHILADELPAIA

Highest References.

NEW PATTERNS

of all kinds of textile novelties (**French, English and German**) supplied by Season's Subscription at moderate rates, or in single parcels of 100—300 new patterns assorted as required, for **$10 per parcel.** Address full particulars as to styles wanted to

A. SMITH, 89 Rue Turenne,

PARIS, FRANCE.

To Manufacturers.

A factory with Railroad Switch east of New Haven. Cost $30,000, price $8,500. 20,000 feet floor space, 100 horse power boiler 80 horse power Corliss engine. Village and help. Special inducements. Particulars and photoggaphs on application. (Folio 8345.)

PHILLIPS & WELLS, Tribune Building, New York.

Do You Want More Trade in N. Y.?

Wanted, agency for Woolen or Cotton Mill. Have good Salesmen and best trade. Have ample facilities to carry stock for own account if necessary. Can furnish A1 references. Address

WESTERN TRADING CO., Incorp.,
423 Broome St., New York.

The Best is the Cheapest.

It is BETTER and CHEAPER to wind yarn by the "Universal" system before shipment from the mill, thus insuring perfect delivery to knitting machines without rewinding.

UNIVERSAL WINDING CO.,

F. H. BISHOP, Manager.

226 Devonshire St., - Boston, Mass.

VULCAN ROVING CAN.

BODY—Vulcanized Fibre. SIDE SEAM—Riveted with Patent Clinched Rivets. RINGS—Tinned Steel, Brazed Joints, Curled Edges. BOTTOM—IXXX. Tin Star Corrugation: Fastened without the use of nails or screws, will not crack, warp or shrink and cannot come out. FINISH—Coated inside end out with moisture proof coating, handsome and smooth. WEIGHT—About one half pound per inch diameter. SIZE—All cans to an exact size, perfectly round and true. DURABILITY—Superior to any other can.

Also manufacturers of Hill's IXXX Tin and Galvanized Iron Roving Can. . . . . .

JAMES HILL MF'G. CO.,
PROVIDENCE, R. I.

TEXTILE DESIGN

TAUGHT BY CORRESPONDENCE.

Send for Prospectus.

GAVEY CORRESPONDENCE SCHOOL OF TEXTILE DESIGN,

P. O. Box 222. **Brooklyn, N. Y.**

YARN DEPARTMENT.

Eastern Yarn Market.

Arnold B. Sanford, Manufacturers' Agent, 45 Milk Street, Boston, reports to us that the cotton yarn industry of New England and the Southern States, finds itself in the midst of extreme dullness. The market seems to be devoid of animation, demand exceptionally quiet, very few new contracts and orders being placed. We usually expect, for the month of August, a slackening in the demand, yet it seems for this year in very marked contrast, as the spinners have been so well employed for the past six months at remunerative prices, and we are glad to report the industry as a whole, has made a profit, enabling the manufacturers of cotton yarns to return fair dividends upon capital invested.

Southern spinners have made very handsome earnings on their product of coarse yarns from 10s to 30s during the past twelve months, values keeping up wonderfully under good demand. Now they find conditions changed, prices have receded 2 to 3 cents per pound, and cannot offer much, if any, margin of profit. They are anxious seekers for orders and of course when dullness sets in, are compelled to cut prices to secure orders. Some are saying: "Result of too rapid increase of yarn mills in the South during the past year." Just at present too much yarn is being made —demand does not keep up with production in coarse Southern yarns.

New England mills on fine yarns also have enjoyed prosperity during the past twelve months, and business is now upon a healthy basis, which we are glad to report as they have been patient waiters for better times and are fully entitled to higher values for their productions, in order to keep up their mills in good condition for wear and tear of machinery, and return little something to stockholders.

At present values, fine yarns are weak owing to poor demand and concessions are made by leading mills to obtain new business. There has been very little addition during the past three years to the output of fine yarns, scarcely any increase in many of the new mills. So the fine cotton spinners are in much better condition than the Southern spinners in regard to supply and demand for their products.

New England hosiery yarn mills and the few outside mills belonging to the syndicate, or combination, have revoked their decision made in July: "That they would not accept any orders for delivery to extend beyond September 1st, at the reduced prices of the Combination." We now hear that they will take orders at the reduced prices of July to be filled after September 1st. This action can be construed only one way, i. e., the large mills who gave up manufacturing cotton goods changed over to making coarse hosiery yarns, have gone in to stay and have proved such formidable competitors that the syndicate now find themselves confronted with a condition and not a theory which they are compelled to face and acknowledge that they no longer can control the hosiery yarn markets.

Several very large corporations of New England and New York State have put their machinery on to hosiery yarns, finding it more profitable business than weaving goods.

This movement has received the approval and endorsement of consumers of hosiery yarns who were anxious to give the syndicate of hosiery mills all the competition possible.

To many well acquainted with the situation when first inaugurated, it was plainly to be seen only one result could follow, i. e., the final dissolution of the power of any number of any kind of textile mills controlling prices of their productions, without inviting

(Continued on page 131.)

Frank E. Patterson, Prest. Oscar W. Wood, Treas

Germantown Spinning Co.

COTTON CARDED

HOSIERY YARNS

In numbers from 6s to 26s.

Germantown, Philadelphia.

W. Warren Thread Works,

WESTFIELD, MASS.

HOSIERY AND SEAMING YARNS.

Also Polished Threads.

Our bleaching and dyeing facilities are new and unsurpassed for prompt and neat work. Correspondence solicited.

Chas. B. Cook, *Pres.* Arthur H. Mason, *Treas*
Capital Stock, $500,000.

SANFORD SPINNING CO.

Fall River, Mass.

32,000 Spindles. Weekly product, 65,000 pounds 6s to 30s.

Colored Cotton Yarn

From American Peelers and Egyptian Cottons.

Solids, Mixtures, Bleached, Combed and Carded Egyptians. Cops and Cones.

AMERICAN SPINNERS'

Cotton Yarn Exchange.

COMBED AND CARDED COTTON YARNS

From Northern and Southern Mills.

ARNOLD B. SANFORD, - MFRS. AGENT,

45 Milk Street,

BOSTON, - - MASS.

(Continued from page 129.)

competition, which would ultimately prove disastrous.

We now feel, with the passing of August, war settled, and the people of the country now having time to give attention to business, with business men feeling and talking in favor of better times, that prosperity will soon become an established fact for all our commercial and industrial enterprises.

Woolen Yarn: Spinners are getting a few orders but not enough to run anywhere near full. Some orders are being placed for backing of worsted heavy-weight cloth, but as the heavy-weight season is nearly over, these orders are getting scarce. The two-ply yarn trade is slow, partly because buyers over-purchased last year and have not used all their stock. There can be no doubt, however, that October and November will see a good demand for these yarns. Many orders were placed early in the year, but were all cancelled afterward. The spinners taking these orders were forced to cover on stocks and own it now, while the buyers of yarn cooly cancelled. This procedure failed, at least, one woolen yarn spinner. The users of this yarn will be forced to purchase later and the spinner will then get the orders. Some yarns are being sold hosiery manufacturers, but not in any large amounts as the buyers have held off on woolen hosiery. Hosiery orders are placed in June by the jobbers and are so purchased until September. After that time duplicates are placed by the retailer to even up stocks. The light business on woolen hosiery is attributed to the fact that prior to the enactment of the Dingley tariff, importers rushed a stock of woolen hosiery over here. Every one stocked up. The domestic manufacturer had a good business also last year, so wool was advancing and the result has been that probably the buyers have stocks on hand and until these are cleaned out, not many large orders can be expected, hence the dull

(Continued on page 133.)

CATLIN & CO.,
YARNS.
67 Chauncy St., Boston
316 Church St., New York.
306 Chestnut St., Philadelphia.

ALEX'R KING & CO.
YARNS.
FINE IMPORTED YARNS A SPECIALTY.
54 Leonard St., New York.

JAMES E. MITCHELL & CO.,
Commission Merchants.
122 & 124 Chestnut St., Philadelpia, Pa.
6 & 8 Summer St., Boston.
Cotton, Woolen & Worsted Yarns.
All numbers on Hand and Made to Order.

O. S. HAWES & BRO.,
WEAVING and HOSIERY **YARNS,**
All Plies and Numbers.
Imported Yarns a Specialty.
82 and 84 BEDFORD ST., FALL RIVER, MASS.

TUCKER & COOK MFG. CO
MANUFACTURERS OF
WHITE AND COLORED COTTON **WARPS**
Nos. 6s to 30s,
On Beams, Jack Spools or in Chain
CONWAY, MASS.

GRANT YARN CO.,
COMBED AND CARDED COTTON
YARNS 42s and above. AND
FITCHBURG, MASS. **WARPS**

E. JENCKES MFG. CO.
Colored Cotton, Hosiery, Woolen and Merino **YARNS**
PAWTUCKET, R. I.

LINEN YARN IMPORTER.
Hughes Fawcett, 115 Franklin St., New York,
Flax, Hemp & Jute Line and Tow Yarns,
FOR WEAVING PURPOSES
Linen Jacquard Harness Twines.
Fine Cotton Harness and Heddle Twines.
For Cotton, Silk, Woolen and Carpet manufacturers. Correspondence solicited. Samples promptly furnished.

CAPACITY, 50,000 Spindles.

ORSWELL MILLS

FITCHBURG MASS.

COMBED OR CARDED

COTTON YARNS

In Chains and Skeins, on Balls, Beams, Spools—single or twisted.

The J. R. MONTGOMERY CO.,

WINDSOR LOCKS, CONN.

Mercerized Cotton Yarn in two or more ply. Gives a permanent lustre equal to spun silk.

Novelty Yarns, Mohair Loops, Cotton Flake and Nub Yarns.

High Grade Cotton Warps, in colors, on beams, in chain warps or in skeins, single or two-ply.

Printers of Cotton, Wool, Worsted or Silk Yarns.

PLAIN AND FANCY PATTERN

Cotton Warps,

WHITE, MIXED AND COLORED.

For SATINETS, BLANKETS, ETC.

WHITTIER COTTON MILLS,

LOWELL, MASS.

INDIAN ORCHARD CO.,

Indian Orchard, Mass.

MANUFACTURERS OF

Lustred Cotton Yarns.

In Various Colors and Twists.

NOVELTY YARNS

In Cotton, Silk and Worsted, in various patterns and colors.

Cotton Warps and Yarns

In Gray and all colors, single or 2, 3, 4 and 6-ply, and Cable Cord.

COLORED COTTON

Machined, Carded or in Roving.

(Continued from page 131.)

business for yarn in this branch of the industry. Again the manufacturers of hosiery have practically to establish entirely new lines, as the tariff on wool is forcing them to use different stock, and prices have all to be adjusted over again, and the public educated up to the same article for more money or a poorer article for the same money. One of the largest manufacturers of overcoatings told the writer that he was manufacturing cloth cheaper today than he had done in his life, and notwithstanding the fact that we have a very high tariff, he is not using a pound of wool, but is running on shoddy, and making a 2-pound cloth for 89 cents per yard. The whole trade is howling for something cheaper and they are getting it, although the values they secure are decidedly on the down side. The complaints of bad business seems to come from everyone. The wool dealer is discouraged, except in spots where business is good and the shoddy man complains, declaring that the early part of the year they had orders to run all season which were cancelled in April. This, of course, does not apply to all, because in some instances many orders have been secured. This may be considered a contradictory report, but this is a contradictory market, and the general trend of business to date is on the dull and discouraging side. Without doubt, the coming fall will see a gradual increase of business and prosperity, as there is plenty of money anxious to invest, but confidence has not yet been fully restored. We have heard of a wool spinning concern trying to work flax that has had a rather curious experience. This concern was started and $30,000 was invested in machinery, etc. When put in operation it was found that the yarn would cost in the neighborhood of $1 per pound to manufacture, against regular flax spinning of about 16 cents per pound. Of course it did not work, and thus ended the flax spinning on woolen machinery. The holiday, on account of

(Continued on page 135.)

Colchester Mills,
SPINNERS OF
Made from Colchester Mills Sanitary Random Yarn
Mule Spun Cotton Hosiery Yarns.
Sales in Charge of A. D. SALKELD, 85 & 88 Franklin St., NEW YORK.
Representing B. B. Smalley, Thos. F. Patterson, F. E. Snow Receivers Colchester Mills.

WOOLEN AND MERINO YARNS.
Special line for Bicycle and Golf Goods in all shades For Hosiery, Gloves, Underwear, and all kinds Knit Goods. Cop, Cone and Skeins.
The J. & H. Clasgens Co.
New Richmond, O.

WOOLEN YARNS.
All grades Woolen, Mixed and Merino yarns.
15 SETS CARDS.
EDWARD M. ROCKWELL,
LEOMINSTER, - MASS.

A. HERBST. J. W. JONES.
HERBST & JONES,
Successors to Kershaw Worsted Co.
WORSTED YARN SPINNERS,
21st & Naudain Streets,
PHILADELPHIA.

ALBERT R. ELSASSER,
Clifton Worsted Mills.
Lustre Worsted Roving and Yarns
A SPECIALTY.
MILLS: ADDINGHAM, DEL. CO. PA.

C. MOORE & CO.,
MANUFACTURERS OF
TWINES, THREADS AND YARNS.
Jacquard Harness Twines of all kinds on hand and made to order.
S.W. COR. FIFTH & MARKET STS.,
Philadelphia.

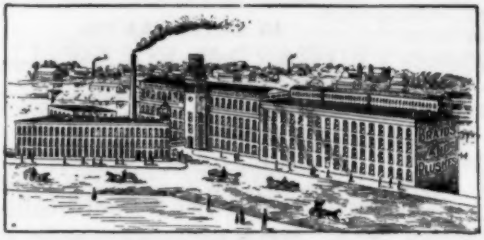
EICHMANN & STERNBERG
530 Broadway cor. Spring St., NEW YORK.
Plain and Gassed Cotton Yarns,
HOSIERY COTTON YARNS,
Mercerized Cotton Yarns (Simile).

COTTON WARPS
White or Colored.
Toweling and Grain Bags.
Dana Warp Mill,
WESTBROOK, MAINE.

HADLEY
SPOOL COTTON AND FINE YARNS
COMPANY
COTTON SPINNERS.
MILLS AT HOLYOKE, MASS.

SPINNERS OF
FINE COTTON YARNS
30s TO 100s.
Gray, Bleached, or Colored. On cop, in skein on spools, cones or tubes.
Fine Cotton Warps, single and two-ply, in chain, etc.
Spool Cotton and Seaming Thread.
95 Milk St., BOSTON.

THE WILLIAM CLARK COMPANY,
WESTERLY, R. I.
Mills equipped with the latest and most improved machinery.
Combed Egyptian from No. 20s to 100s. Combed Sea Island from No. 40s to 200s.
Also 2, 3, 4, 5 ply and 6, 9 and 12 ply cable laid.
Hosiery Yarns on Cops Tubes or in Skeins, Grey, Bleached or Dyed. (Fast Colors.



FLYER SPUN
Mohair and Worsted
YARNS.
Mohair Plushes,
Worsted and Cotton Braids.

D. COFF & SONS, Pawtucket, R. I.
— ESTABLISHED 1861. —

MONUMENT MILLS,
Manufacturers of
White, Colored, Fancy and Double and Twist,
COTTON WARPS
HOUSATONIC, MASS. 4s to 60s.

YARNS
SOLIS : : BOSTON.
179 Devonshire Street.
ANDREW J. SOLIS, Jr. & CO.

GREENE & DANIELS MFG. CO.,
COMBED, CARDED AND GASSED
Yarns, Threads, Twines and Chain Warps,
Colored and Bleached Yarns Furnished in any manner desired by the trade.
PAWTUCKET, R.I.

A copy of the Textile World's Directory is presented to every paip-up subscriber of the Textile World, with the compliments of the publishers.

Continued from page 133

water being out of the canal, took place in Cohoes, this year, August 13-17. Business in that section is quiet. Bennington and Mohawk Valley are likewise quiet. Knitters will be forced on the market to buy wool and yarn in January, if not before, as many are running shy on stock. Undoubtedly, October and November will see some good buying of wool from the knitters using fine wool and fine yarn.

Worsted Yarn: Spinners are getting many inquiries, and some orders. The market is developing some very curious and contradictory statements. From spinners we hear of other spinners who have great faith in the worsted yarn market and we hear of those who are holding 2/40s, one-half blood yarn, for $1.00 per pound, and we hear from weavers that spinners are breaking prices and are actually selling fine Australian yarn 10 cents per pound cheaper than what was paid last year. We quote a Philadelphia spinner as saying that "offers were plentiful, but that they did not intend to fill up with low-priced orders, as later they were sure of much higher prices." However con-

(Continued on page 125)

Philadelphia Yarn Market.

The yarn market still shows considerable weakness, although there has been no particular change in the past month in some yarns.

The Eastern combination reduced prices for the present on hosiery yarns one cent per pound, which has affected the whole market to some extent. Although prices were previously as low on some Southern yarns as to-day.

The upholstery trade is still very dull, also the woolen trade using cotton warps. Single and two-ply warps are cheaper than ever known before in many instances. We quote warps.

WARPS.

20/1	12 to 12¼
22/1	12¼ to 12¾
26/1	13 to 13¼
12/2	13
14/2	13 to 13¼
16/2	13¼
14/1	11¼ to 12
16/1	12
20/2	13⅓
30/2	16 to 16½
40/2	22½ to 23½

SKEIN.

26/1	13
20/1	12 to 12½
19/1	12 to 12½
4s to 10s soft	11 to 11½
12/1 soft	11¼ to 12

(Continued on page 137.)

Walcott & Campbell Spinning Co,
IROQUOIS MILLS.
FANCY HOSIERY YARNS
IN ALL COLORS.
New York Mills, Oneida Co., N. Y.

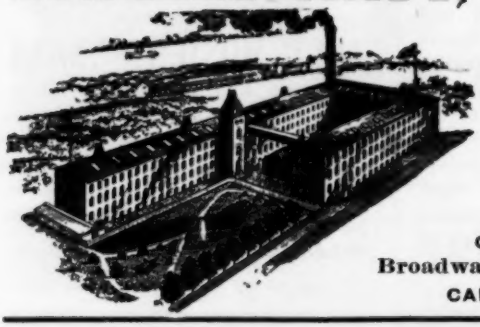
BURNET & CO.,
24 George Sq., Glasgow, Scotland.
All numbers and qualities of Cotton Yarns, specialities in
"Silkoline," "Ramie" and Fancies; also bleached filling on long tubes. Turkey reds, etc. A B C Code used. Telegraphic address "Tenrub, Glasgow"

B. F. BOYER & CO.,
Successors to GEORGE SHIMER & BOYER,
HOSIERY YARNS,
In Wool, Merino and Worsted.
GOLF YARNS,
In Wool and Worsted. Also carry a full line
BUNDLE YARNS
For the Jobbing Trade.
MILLS AND OFFICE AT
CAMDEN, - - N. J.

Eddy & Street,
COTTON, WOOLEN, YARNS AND BRAIDS WORSTED, SPUN SILK.
PROVIDENCE, R. I.

Cohannet Mills,
TAUNTON, MASS.
Spinners of High Grade
HOSIERY YARNS OF EVERY DESCRIPTION.
Selling Agents JAMES E. MITCHELL & CO, Philadelphia and Boston.

HOWLAND CROFT, SONS & CO.



LINDEN WORSTED MILLS.

Fine Worsted Yarns

OFFICE AND MILLS:
Broadway and Jefferson Avenue,
CAMDEN, NEW JERSEY.

ALLEGHENY WORSTED MILLS,

Thomas Wolstenholme, Sons & Co., MANFRS. OF

ALL NUMBERS SINGLE AND TWO-PLY,

Worsted YARNS,

Sell Direct,

on Cop or in Skein, for Weaving and Knitting Purposes, in White, Natural & Fancy Mixes.
Office and Mills: Frankford Ave. and Westmoreland St., Phila., Pa.

CRANSTON WORSTED MILLS.

Worsted and Mohair Yarns—white or colors, in skeins, on spools, cones, or shuttle bobbins.

NOVELTY YARNS—of Mohair and Worsted. We are the only manufacturers in the United States making these yarns from the raw material to finished product and making Yarns only.

CENAPPED YARNS of all kinds. Doup Yarns. Harness Yarns for Braids, etc.

BRISTOL, R. I.

George Campbell & Co.

Worsted Spinners,

Yarns, both French System and Bradford.

Knitting Yarns in all Grades and Mixes.
All Numbers to 60s.

21ST STREET AND WASHINGTON AVENUE, PHILADELPHIA.

MALCOLM MILLS CO.,

MANUFACTURERS OF

Novelty Yarns, Silk Noil Yarns, in Fast Colors AND White.

Mills, Frankford, Pa. Office, 229 CHESTNUT ST., PHILA.

(Continued from page 135.)

20/2	13 to 13½
14/2	12½
30/2	16
40/2	21 to 22½
8/3	10½ to 10½
10s double reeled	10½
16/3	12½
16/4	12½
16/2	12½ to 13

SOUTHERN CONES.

6s to 8s, various qual.	12 to 12½
10s " "	12½ to 13
12s " "	13 to 13½
14s " "	13½ to 14
16s " "	14½ to 15
20s " "	15 to 16
24s " "	16 to 16½
26s " "	16½ to 17
30s	18 to 18½

SHUTTLE COPS.

6s to 8s	12
12s	12½
16s	13
26s	13½
40s	18 to 19

MIXED COLORED CONES.

6s to 8s	13½
10s	13½ to 14
12s	14½ to 15
14s	15
16s	15½ to 16

EASTERN COPS.

12s shuttle	13 to 13½
14s "	13½ to 14
16s "	14
12s hosiery	13½ to 14
14s	14 to 14½
16s	14½ to 15
20s	15½ to 16
24s	16 to 16½

Eastern skein ½c. above cops.

Eastern cones ½ to 1½c. above cops.

Egyptian, carded, 4 to 5c. above white.

Combed yarn, 4 to 5c. above carded.

SILK NOILS AND SILK NOIL YARNS
IN WHITE AND COLORS.
MOHAIR LOOPS, KNOTS, AND FANCY YARNS FOR DRESS GOODS AND CLOAKINGS.
A. T. SKERRY & CO., 47 LEONARD ST., NEW YORK.

THE PHOENIX MILLS CO.,
MANUFACTURERS OF
Fine Worsted Yarns.
Correspondence Solicited. Samples furnished on application.
BOSTON OFFICE: 620 Atlantic Ave. Rooms 10 and 11.
PHILA. OFFICE.
MILLS: 10th & Germantown Ave., Phila. Chester, Pa.
No. 13 LETITIA ST.

GEORGE SHIMER & SON,
Spinners of Worsted Yarn for the Weaving and Knitting Trade.
All kinds of Fancy Yarns for the Knitting Trade.
5th and Erie Sts., Camden, N. J.

Knitting and Weaving Yarns
Cones, Cops, Warps, Skeins,
Single, Double, Three-ply, etc.
Peeler, Egyptian, Mixed Colors.
Large Assortment.
EDWARD S. HYDE, 223 and 225 Chestnut Street, Philadelphia, Pa.

CHENEY BROTHERS,

SILK MANUFACTURERS.

ALL KINDS OF

Knitting Silks, Ribbons AND Piece Silks,

USED FOR TRIMMING KNIT GOODS.

TRAMS, ORGANZINES and SPUN SILKS, in the Hank, or on Spools or Cones, for Manufacturers' Use. Silk for Special Purposes Made to Order.

MILLS: South Manchester and Hartford, Conn.

SALESROOMS: 477, 479 and 481 Broome Street, NEW YORK.

79 Chauncy Street, BOSTON.

186 Franklin Street, CHICAGO.

WILLIAM RYLE & CO.,

DEALERS IN

Domestic Thrown Silk of every description. Fine Pure Dye Silks for the woolen trade a specialty. Foreign and domestic

SPUN SILK YARNS AND NOILS

Importers of European and Asiatic Raw Silk.

54 Howard St., cor. Mercer St., - NEW YORK.

C. J. LITTLEWOOD & SONS, Ltd.

ALBION

DYE and BLEACH WORKS,

MANAYUNK, PA.

DYERS of Cotton, Cotton Yarns, Wool and Raw Stock Generally. **BLEACHERS** of Cotton and Cotton Yarn.

CITY OFFICE: 132 Chestnut Street. Telephone Connection,

PHILADELPHIA. MAIN OFFICE AT THE WORKS.

[PATENT APPLIED FOR]

IRONPHALT ROOFING

Guaranteed for 6 years when applied as per our specifications.

Is the most permanent covering for all kind of buildings, Ready for application. Write for samples and compare with other roofings.

Catalogue Free.

SPECIALTIES: 2 and 3 Ply Roofing, Insulating, Building and Sheathing Papers, Asphaltum, Pitch, Roof Paints, etc.

ARMITAGE MFG. CO., **Richmond, Va.**

PROVIDENCE DYE WORKS.

Dyers and Finishers,

COTTON YARNS, Suited for HOSIERY and WEAVING Cotton, Woolen and Worsted DRESS GOODS, Woolen and Worsted Mixed CASSIMERES and CLOAKINGS, also Woolen and Worsted Slubbing, COTTON YARN and WARP DYERS and BLEACHERS.

FIRTH & FOSTER CO.,

OFFICES: **Philadelphia, 546 Bourse Building.**
New York Office, Silk Exchange, Broadway and Broome St.
WORKS: **Taylor, Emerald and Adams St., Kensington, Philadelphia, Pa.**

Boston Finishing Works

WILLIAMSTOWN, MASS.

BLEACHERS, DYERS AND FINISHERS

Of Pure Finish Shirtings, Sheetings, Canton Flannels and Filled Good Also Silesias, Satteens, Corset Jeans, Cambrics, Sleeve Linings, Pocketings, Flannelette, and all descriptions of Dyed Goods.

NAPPING A SPECIALTY.

Being equipped with the French and other Foreign and Domestic Napping Machines we are prepared to give any kind of Nap required, including the French FlannelFinish.

R. GREENWOOD & BAULT,

GLOBE DYE AND BLEACH WORKS,

FRANKFORD, - PHILADELPHIA.

Specialists in Cotton Warps and Skein Dyeing.

HOME BLEACH AND DYE WORKS,

PETER B. McMANUS, Proprietor.

Dyers and Bleachers of Cotton Yarns,

PAWTUCKET, R. I.

Pawtucket Dyeing & Bleaching Co.,

BLEACHERS AND DYERS OF

COTTON YARNS AND STOCKINET.

OFFICE WITH **BLODGETT & ORSWELL CO., Manufacturers of Glazed Yarns,**
28 BAYLEY ST., PAWTUCKET, R. I.

COCHRANE CHEMICAL CO.,

50 Kilby St., Boston, Mass.,

MANUFACTURERS OF

ACIDS, AMMONIAS, ALUMS, SODAS

And other Chemicals.

FAST COLORS

for Wool, Woolen and Cotton Yarn and Piece Goods Dyeing, and for Calico Printing

ALIZARINE RED, PASTE AND POWDER.

Alizarine Blues, Oranges, Browns, Yellows, Maroon, Gray and Black.
Cœruleine, Galleine, Mythylene Grays.
Thionine Blues, Thionine Indigo, Solid Green and
PATENT BLUES (superseding Extracts of Indigo on account of fastness and color bloom) for Wool and Silk, Benzidine and Primuline Colors, Zinc Dust, Aniline Salts and Oil.

VICTOR KOECHL & CO. 122 HUDSON ST., NEW YORK.

SOLE AGENTS FOR

FARBWERKE, formerly MEISTER, LUCIUS & BRUENING, HOECHST o | M.; A. LEONHARDT & CO., Muehlheim o | M.

BRANCH OFFICES:

Boston, Mass., 138 Milk St.; Philadelphia, Pa., 39 N. Front St.; Providence, 45 S. Main St.

New York and Boston Dyewood Company,

MANUFACTURERS OF

DYEWOOD EXTRACTS.

Sole Agents for the United States and Canada for
ACTIEN-GESELLSCHAFT FUR ANILIN-FABRIKATION, BERLIN.
Specialties for Wool, Silk and Cotton.

BENZO PURPURINE B, 4 B, 6 B; BRILLIANT PURPURINE R; BRILLIANT CONGO R, etc.
CHROME FAST BLACK B, a new fast black for wool.

NEW YORK: 55 BEEKMAN ST. PHILADELPHIA: 124 ARCH ST.
BOSTON: 117 HIGH ST. HAMILTON, ONTARIO.

Established 1834. H. G. JOHNSON, Proprietor.

Wm. G. Johnson Co.

Manufacturers of

DYEWOODS Logwood Extracts, - - -
Ground and Bolted Camwoods
And other Fancy Woods. -

All Goods Warranted Uniform.

Long Distance Telephone. **UNCASVILLE, CONN.**

JOHN J. KELLER & CO.,

104 and 106 MURRAY STREET,
NEW YORK.

220 Church St., Philadelphia. 135 Pearl St., Boston.

Aniline Colors,
Dyewood Extracts,
Sumac and
Nutgall Extracts.

FAST COLORS for wool dyeing, one dip cotton colors, novelties and specialties for calico printing.

—— MANUFACTURED BY ——

JOHN R. GEIGY & CO., Basle, Switzerland.

WM. J. MATHESON & CO., Ltd.

IMPORTERS AND MANUFACTURERS OF

DYE STUFFS

New York,
Boston,
Philadelphia,
Providence,
Charlotte, N.C.,
Montreal, Canada.

FARBENFABRIKEN OF ELBERFELD CO.

40 STONE STREET, NEW YORK.

BOSTON. PHILADELPHIA. CHICAGO.

Alizarine Black-Bayer

(DIAMOND BLACK.)

The Cheapest Fast Black for Wool.

C. BISCHOFF & CO.,

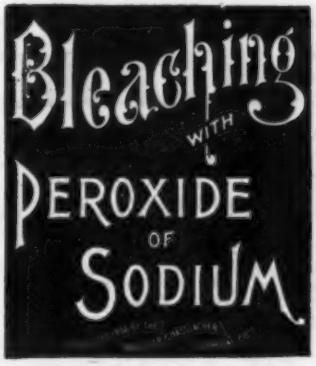
87 and 89 Park Place, New York. Branches, 139 S. Front St., Phila. 104 Broad St., Boston.

Rhodamines, Patented.

Alizarine Blacks, Patented.

WITHOUT COST

Bleachers can obtain all necessary information regarding



by writing for free copy of pamphlet to

THE ROESSLER & HASSLACHER CHEMICAL CO.

OFFICE: 100 WILLIAM ST., NEW YORK.

Peroxide Works, Niagara Falls.

Boston, 21 Pearl St. Chicago, 4[N. Clark St.

O. S. JANNEY & CO.,

IMPORTERS OF

INDIGO, CUTCH, GAMBIER, SICILY SUMAC, ANILINES, ETC.

AND DEALERS IN

Dyestuffs, Extracts and Chemicals.

Full Lines of Direct Colors for Cotton, and Acid Colors for Wool.

No. 70 Kilby Street, BOSTON.

No. 8 and 10 Letitia Street, PHILADELPHIA.

SYKES & STREET,

NEW YORK.

BOSTON. CHICAGO. PHILADELPHIA.

Aniline and Alizarine Colors.

Aniline Oil and Salt.

Dyewood Extracts, Etc.

THE STAMFORD MANUFACTURING CO.

MANUFACTURERS OF

CUT and GROUND DYEWOODS,

Dyewood Extracts and Liquors,

FLAVINES.

Importers of CHEMICALS and DYESTUFFS.

188-187 Front Street, - New York.

New York. Established 1865. Philadelphia.

ANCHOR COLOR MANUFACTURING CO.,

HAVANA COLORS FOR COTTON.

ALIZARINE AND MAZARINE COLORS for Wool, Yarn and Piece-Goods.

One-Dip Blacks and One-Dip Blues for Mixed Goods.

Lactic Acid, Alizarine Mordant, Archil Liquor, Cudbear, Extract Indigo, Indigotine'

ACID BLACKS.

462, 464, 466 Cherry Street, New York.

PHILADELPHIA Office: 109 N. Front Street.

A. KLIPSTEIN & CO.,

NEW YORK. BOSTON. PROVIDENCE. PHILADELPHIA.
CHICAGO. CINCINNATI. HAMILTON.

Dyestuffs and Chemicals.

Fast Colors for Wool.
Dry Alizarine.
Phenocyanine,
Direct Cotton Colors.
Congo Red,

Refined Cutch A. K. C.
Caustic Potash.
Azo Colors.
Napthol Yellow.

American Aniline Colors FOR Cotton, Wool and Silk.

THE HANNA-SCHOELLKOPF CO., Philadelphia.

The STONE & WARE CO.,

IMPORTERS AND MAFUFACTURERS

Colors, Dyestuffs and Chemicals.

145 Kinzie Street, CHICAGO. 157 Malden Lane, NEW YORK, Zurich, SWITZEREAND. 105 Reed Street, MILWKUKEE.

NEW CHROME MORDANT

(Amend Process)

Saving in Steam
Saving in Dyestuffs
Saving in Weight of Fibre
Improvement in Quality of Fibre
Improvement in Colors
Also Applicable to Silk.

AMEND PROCESS CO., 205-211 Third Ave., NEW YORK.

N. SPENCER THOMAS CO. Elmira, N. Y. Boston, Mass. Philadelphia, Pa.

Fast One-Dip Blacks on Cotton and Wool Mixed Goods and Raw Cotton a specialty. | One-Dip Balbriggan and other Underwear shades are absolutely Fast and give a silk finish.

STARCH, DEXTRINE and GUMS.

STEIN, HIRSH & CO.,

165 Duane St., NEW YORK.
FACTORIES:
Chicago, Ill. and Hammond, Ind.

WEST INDIES CHEMICAL WORKS, Ltd.,

MANUFACTURERS OF PURE **LOGWOOD EXTRACTS** SPANISH TOWN, JAMACIA, W. I.

DILLON & CO., 20 Cedar St., New York, SOLE AGENTS FOR THE UNITED STATES AND CANADA.

READ HOLLIDAY & SONS, Ltd.,

No. 100 William Street, - New York,

Manufacturers of **Acid Magenta.** (Patented.)

Specialties: Acid Blacks for Wool, and One Dip Dyes for Cotton.

Aniline Dyes, Aniline Oil, Aniline Salts, Arseniate of Soda, Chlorate of Potash, Yellow Prussiate of Potash, Indigo, Indigo Extract, Archil Liquor, Cudbear, Picric Acid, Zinc Auxiliary, Chemicals, Etc.

Works: Huddersfield, Eng., Brooklyn, N. Y. Branches: BOSTON, 125 Pearl St., PHILA. 61 N. Front St.

BOSSON & LANE,

ANTI-CHLORINE *FOR BLEACHING COTTON. NO ACID. NO SOAP.*

Dyestuffs, Chemicals and Aniline Colors.

36 CENTRAL WHARF. BOSTON, MASS.

OAKES MANUFACTURING CO.,

Hematine, Extracts of Dyewoods, Chemicals.

New York. Boston. Philadelphia. Atlanta.

S. J. COREY Dyestuffs and Chemicals. Phthalein, Alizarine and other Fast Colors for Cotton, Wool and Silk. Shades matched and full particulars sent on application. Indigo, Dyewoods and Extracts, Nubia One-Dip Fast Black for Woolens, Lion Ammonia Wool Scourer, &c. Agt. for Stutz & Co., London; W. F. Stutz, Calcutta; and Williams & Co., Madras. **273 Congress St., Boston, Mass.** **DYESTUFFS**

THE SHARPLESS DYE-WOOD EXTRACT CO.,

OFFICES: 648, 650, 651 THE BOURSE, PHILADELPHIA.

Warehouse: 22 N. Front St., PHILADEDPHIA. Works: CHESTER, PA.

—MANUFACTURERS OF—

DYEWOODS AND EXTRACTS.

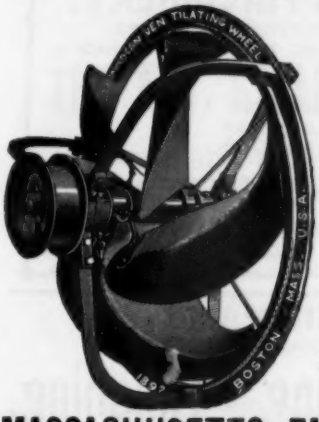
LOGWOOD.
FUSTIC.
BARK.
BLACK DYE.
CUTCH.

Extracts of Indigo, Indigo Carmine.
Indigotine, Refined and Reduced Indigo.
Indigo Substitute.
Bisulphite of Soda.
Peroxyde of Hydrogen.
Alizarine Assistant 30 & 50%
Soaps.

THE Jaeck Bros. Co.
62-68 North 11th St., BROOKLYN, N. Y.

Fast Black.
Acetate of Chrome.
Cutch and Gambier Extracts.
Colorless Sumac.—Sucrosine.
Specialties:
French Dressings and Finishings for Silk, Wool and Cotton.

THE DAVIDSON FAN WHEEL



SAVES YOU

Power,
Belting,
Shafting,
Time,
Annoyance,
Repairs.

Each One Means MONEY.

Estimates, Prices & Catalogues, FREE.

MASSACHUSETTS FAN CO., 642 EXCHANGE BUILDING BOSTON.

From 1 to 6ft. in Diameter.

NEW ENGLAND

Ventilating and Heating Company.

Our system of Ventilating and Drying by air circulation will improve quality and increase production.

PLANS AND ESTIMATES ON APPLICATION.

OFFICE AND WORKS:

926, 928 and 930 Manton Avenue, Providence, R. I.

WEBSTER DYEWORKS,
Manufacturers and Dealers in
Dyestuffs and Chemicals
Also Dyers of Cotton, Worsted, Hosiery Yarns, Piece Goods, Raw Stock, etc.
Address, P. O. Box 604, WEBSTER, Mass.

THE SECRET of our popularity is no secret to our customers. Experience has taught them that we give them better work and better service than they can get elsewhere.

T. BROPHY'S SONS,
Dyers of all kinds of Yarn and Cotton Warps,
Jasper Street, above Clearfield Street,
PHILADELPHIA.

NOVELTY TEXTILE PRINTING CO., Inc.,
Printers and Embossers of Textile Fabrics.
NOVELTIES IN GOLD EFFECTS, ETC.
447-449 West 14th St., New York.

JOHN S. ADRIANCE,
ANALYTICAL and CONSULTING CHEMIST,
Examination of Mill Supplies a Specialty.
105 East 39th St. New York.

DYE STICKS Drying and Sulphur House Poles of Natural Round Water Grown Cedar for Cotton, Wool, etc. Special Hardwoods in Standard No 1 and "Selects" without knots, grades, for Silk Dyeing. Our Woven Cedar Picket Fence, is the best and cheapest for Mills and all enclosures. Manufactured by, prices and all information from
E. M. HAEDRICH,
311½ Walnut St., Philadelphia.

1908
N. FRONT ST.
PHILADELPHIA
PA.
JOSEPH
WILDMAN
MANUFACTURER OF

DYER'S CLOGS

A copy of the Textile World's Directory is presented to every paid-up subscriber of the Textile World, with the compliments of he publishers.

BLEACHING AND DYEING MACHINERY.

SKY BLUING AND CUTTING MACHINES.
CALENDERS, STARCH MANGLES, CALENDER ROLLS OF PAPER, COTTON AND HUSK.
ANILINE BLACK MACHINES.
CHROME DYEING MACHINES.
ANILINE AGEING MACHINES.

BEST WORKMANSHIP AND MATERIALS.

PHENIX IRON FOUNDRY, PROVIDENCE, R. I.
CHAS. R. EARLE, Pres. and Treas, M. W. GARDINER, Jr., Sec'y.

THE LINCOLN COMPANY,

MANUFACTURERS OF IMPROVED MACHINERY FOR

Bleaching, Dyeing, Drying and Finishing.

Sole Makers for the United States of
Mather & Platt's Patent Self-feeding Tenters.
Complete Plants for
BLEACHING, ANILINE BLACKS AND INDIGOS.
54 to 70 Arch Street, - HARTFORD, CONN.

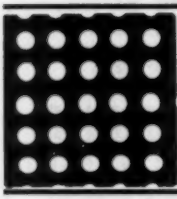
New Bedford Copper Co.,

NEW BEDFORD, MASS.

HEADQUARTERS FOR . . .

Copper Printing Rollers

We Guarantee Perfect Work. Prompt Shipment.



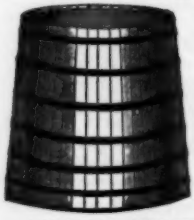
Perforated Copper.

For Wool Washing and Rinsing Boxes.
Perforated Duster Screens on Trial.
A. J. BECKLEY & CO.,
Garwood, N. J.
N. Y. Office, 123 Liberty St.

RILEY'S PATENT RIGGING CUTTLING FOLDING MACHINES

For all kinds of Gray or Finished Stuffs, Woolens, Worsteds, etc.
CHAS. A. JOHNSON & CO. } SOLE AMERICAN AGENTS.
New York and Providence.

TANKS



All Kinds and Sizes

FOR FACTORIES, DWELLINGS, AND FARMS.

Steel Towers for Tanks a specialty.

CHALLENGE WIND MILL & FEED MILL CO.,
195 High Street. Boston, Mass.

The Cypress Lumber Co.

CYPRESS TANK . . . FACTORY.
APALACHICOLA, FLORIDA.

THE A. T. STEARNS LUMBER COMPANY.

FLORIDA GULF CYPRESS A SPECIALTY.

Cypress Lumber, Cypress Shingles, Cypress Timber, Georgia Pine, Florida Ash, Spruce and Hemlock.

Rift Hard Pine, Ash, Oak & Maple Flooring.

QUARTER SAWED CYPRESS SQUARES.

Cypress Sheathing and Clapboarding.

GUTTERS AND CONDUCTORS.

MOULDINGS, BRACKETS, COLUMNS, ETC.

Doors, Windows and Blinds.

BUILDERS' FINISH OF EVERY DESCRIPTION.

Window and Door Frames, Stair Posts, Rails and Balusters, Store and Office Fittings, Counters, Bowl Stands, Mantel Shelves, Etc.

Carpenter and Mill Work of All Kinds.

SASH BARS AND GREENHOUSE STOCK.

TANKS, CISTERNS, DYE TUBS.

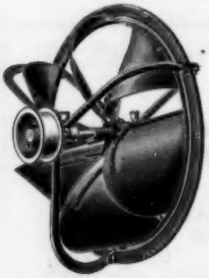
FENCE POSTS, RAILS AND PICKETS, CYPRESS BOAT STOCK.

Kiln Dried Lumber Always in Stock.

Send for Book, "Cypress Lumber and its Uses." No Charge.

Main Office, Mills and Wharves at Neponset,
Office and Exhibit, 166 Devonshire Street,
Office and Warerooms, 104 Friend Street,
} BOSTON.

P. O. Address, Neponset, Mass. Long Distance Telephones.



23 West First St., BOSTON.

THE REMOVAL OF

STEAM

AND THE

DRYING

OF ALL KINDS OF MATERIALS

SUCCESSFULLY ACCOMPLISHED

— BY —

THE BERRY WHEEL.

THE NEW YORK MILLS

Are using two of these

Caldwell Tanks and Towers

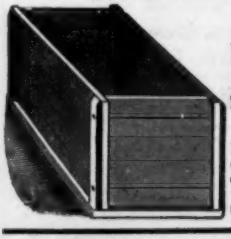
At New York Mills, New York.

Tanks 15,000 gal. capacity. Towers 100 feet high.

Write for our illustrated catalogue and pricelist.

W. E. CALDWELL CO.,

202 BROOK ST., LOUISVILLE, KY

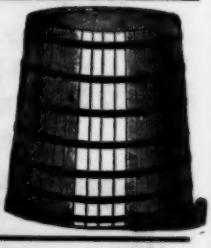


GEORGE WOOLFORD,

Vat and Cedar Tank Factory,

2240-44 N. Ninth St., Philadelphia.

Dye-Tubs, Water Tanks, Wash Boxes, Bleaching Tubs, Bine Vats, Boiling Keirs, etc. **RESERVOIR TANKS,** any capacity or shape, for factories, dwellings villages, farms, etc. **Please send for Estimate, and we will Guaranteed Satisfaction.**



A. J. CORCORAN'S

Tanks, Vats, and Dye Tubs,

ARE PERFECT.

Cedar, Cypress, Pine, Oak, or other woods.

Factory Jersey City. STORM DEFYING WIND MILLS.

OFFICE AND SALESROOMS,

Phone 3947 Cortlandt. No. 11 John St., New York City.

COPPER ROLLERS,

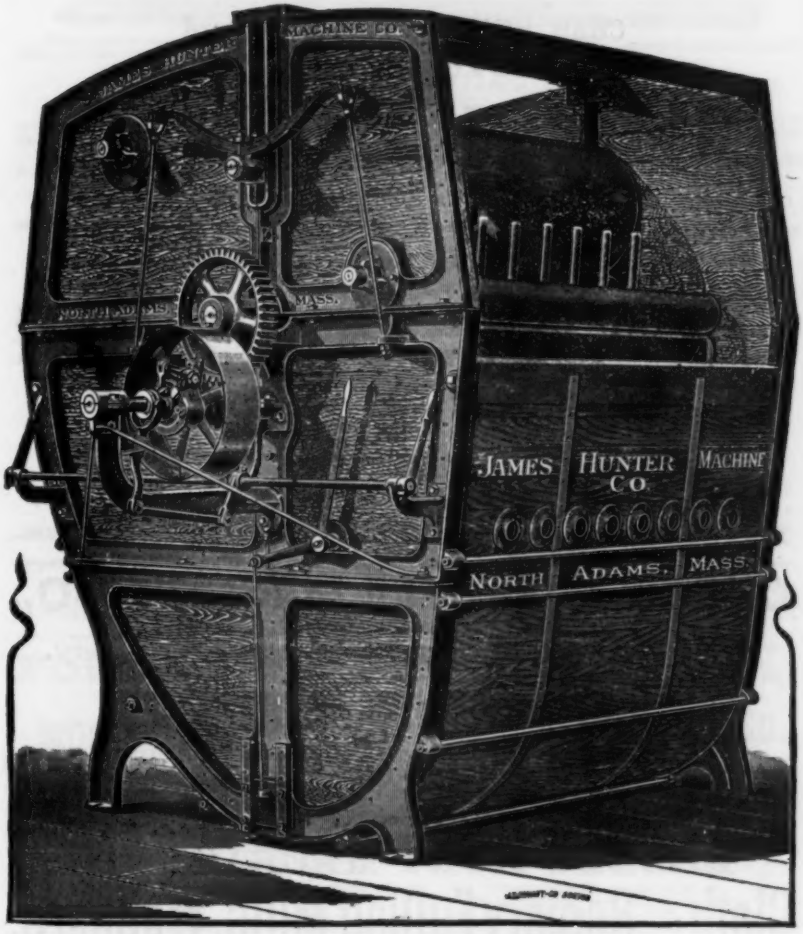
SINCE PLATES AND SHEETS

For Printers and Dyers. New Methods and Superior Product.

Revere Copper Co., 174 OLIVER STREET, BOSTON.

HUNTER'S IMPROVED CLOTH WASHER

For Four, Six and Eight Strings of Goods.



Power transmitted by means of a Friction Pulley.
No Shifting of Belt to start and stop the machine.
Less power required than for any other Washer of equal capacity.
All Main Bearings are adjustable. All Bearings are on the outside of frames.
No dripping of Oil on the Goods, or in the Wash Box.

Also Combination Washer and Fuller for Knit Goods in the String.

Write for further particulars and prices

JAMES HUNTER MACHINE CO.,

North Adams, Mass.

Boston Office, Room 67, Mason Building, 70 Kilby St.

Long Distance Telephone, 2954.

The American Napping Machine Co.

— OWNERS OF THE —

CHAS. HEAP, U. S. N. M. CO., and
DAVIS & FURBER PATENTS on

NAPPING MACHINES,

Combining the Latest FRENCH, ENGLISH and AMERICAN IMPROVEMENTS.
Manufacturers are Cautioned against Buying or Using Infringing Machines.

SYDNEY HARWOOD, Pres., 53 State St., Boston.
H. H. HEAP, Treas. and Gen. Man., Williamstown, Mass.
C. J. JONES, Selling Agt., 2710 to 2726 Mascher St., above Lehigh, Philadelphia.

DAVIS & FURBER MACHINE COMPANY,

Builders and Selling Agents.

North Andover, - Mass.

CURTIS & MARBLE MACHINE CO.,

MANUFACTURERS OF
Wool Burring, Picking and Mixing Machinery.

Cloth Finishing Machinery

FOR COTTON, WOOLEN, WORSTED, PLUSH GOODS, ETC.
SHEARING MACHINES A SPECIALTY.

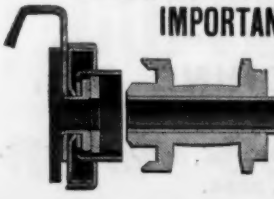
Send for Descriptive Catalogue.
New Works, 56 Cambridge St., near Webster Sq. WORCESTER, MASS.

RODNEY HUNT MACHINE CO.,

Cloth AND Hosiery Fulling Mills, Washers, Turbine Water Wheels.

Works and Main Office, Orange, Mass.
Boston Office, 70 Kilby Street.

Send for
New Catalogue.



IMPORTANT IMPROVEMENT IN WORSTED SPINNING.

The Bamford Dust Proof and Self-Lubricating Spindle Tube saves oil, prevents clogging with dust and lint, thereby insuring longer life to the tubes, saves labor, maintains uniform speed, **and most important of all**, makes PERFECT YARN. Have been adopted by the largest New England manufacturers after a thorough trial.

ADDRESS: BAMFORD & SMITH, Pascoag, R. I.

ARE YOUR GOODS STRONG ENOUGH?

Every manufacturer has had experience at some time with tender goods, entailing claims, expense in replacement, and great annoyance to manufacturer and customer. This can be prevented by the use of the

HERCULES CLOTH-TESTING MACHINE.

[Patented Aug. 2, 1897.]

The clothing manufacturers expect goods that will stand a strain of 90 lbs to the inch, and if they don't come up to that test, are likely to be classed "tender." This machine enables you to know how your goods test by the same standard that the clothiers use, viz: THE HERCULES.

Is light (16 lbs.), small (36 x 5 in.), handsome (polished brass and steel on an oak base) and inexpensive, and so reliable and simple that a boy can operate it.

PRICE $25.00 WITH OAK CABINET.

S. McKNIGHT, **771 Broadway, New York.**

WOONSOCKET
Napping Machinery Co.

PAT. KNOT
SAVING SHEAR

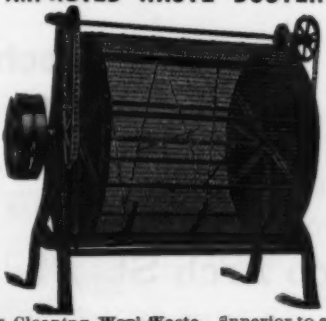
With or without **List Saver.**

NAPPERS

Of all kinds, including the **French with Latest Improvements.**

WOONSOCKET, - R.I.

IMPROVED WASTE DUSTER



For Cleaning Wool Waste. Superior to any now in use. Manufactured by the Stillman-Randall Machine Co., Westerly, R. I. Send for circular

FOWLES & CO.,

Importers and Dealers

WOOLS, NOILS, HAIR,

Shoddies, Waste, Flocks, Etc.

106 Church St., Philadelphia.

M. B. SCHWAB, Pres. D. W. SCHWAB, Sec.
H. RAWITSER, Treas. ED. GLUECK, Gen. Mgr.

Riverdale Woolen Co.,

MANUFACTURERS OF

SHODDIES

OF EVERY DESCRIPTION.

Capacity 7,000,000 pounds per annum.
Custom Carbonizing and Garnetting a Specialty.

RIVERDALE, NORTHBRIDGE, - MASS.

New York Office: 140 Duane Street.

Cloth Washers, Fulling Mills, Piece Dyeing Machines, etc.

You want the best, We build them.

A. HOPKINS & CO.,

BRIDGETON, - - R. I.

GLUTROSE.

Glutrose Sizing will effect a saving of 25% to 30% of flour or starch.

Glutrose Sizing will penetrate the goods better, go farther and finish better than anything else, adding much to the strength, stiffness and lustre of the goods.

Glutrose Sizing has no offensive odor, and goods prepared with it will retain their condition better under severe climatic changes.

Glutrose is a neutral compound and **will not injure colors.**

Manufactured solely by AMERICAN GLUTROSE WORKS,

Office, Penn Mutual Building, - 925 Chestnut Street, - PHILADELPHIA, PA.

TEXTILE WORLD'S EMPLOYMENT BUREAU.

CONSULT IT!

Nye & Tredick,

Manufacturers of

CIRCULAR RIB

Knitting Machinery.

Absolute Mechanical Stop Motion for Knitting Machines.

Office and Show Rooms

606 Arch St., Philadelphia, Pa., U. S. A.

LEWIS JONES,

60½ and Media Sts, Philadelphia

GAS ENGINES for city or country. } EFFICIENT
BRUSHING MACHINERY } DURABLE
KNITTING MACHINERY } LOW IN PRICE.

CRANE MFG. CO.

LAKEPORT, N. H.

Spring Needle Circular Knitting Machine

For Hosiery, Shirts, Drawers, Jersey Cloth and Stockinet.

A Specialty of Hardened Bladed Burr Wheels with Self-Oiling Brackets.

H. BRINTON & CO.,

Successors to

BRINTON, DENNEY & CO.,

Builders of a Full Line of

CIRCULAR RIB and SEAMLESS KNITTING MACHINERY,

FOR

UNDERWEAR AND HOSIERY.

213 and 215 Race Street

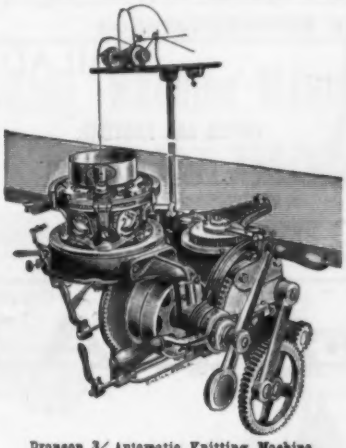
PHILADELPHIA, PA.

BRANSON MACHINE CO.

... BUILDERS OF ...

Knitting Machinery.

Hand or Power, Open Top or Hold Down, Semi or Plain,



Branson ¾ Automatic Knitting Machine.

Welt or Two-Feed Ribbers. Loopers and Parts. Presses and Boards.

¾ Automatic Knitters,

All Sizes and All Gauges.

WINDERS and BOBBINS. HAND FORGED STEEL CYLINDERS.

BRANSON MACHINE CO.,

506 St. John St., Philadelphia, U. S. A.

WRITE FOR INFORMATION AND CATALOGUE.

ROBERT W. SCOTT. LOUIS N. D. WILLIAMS

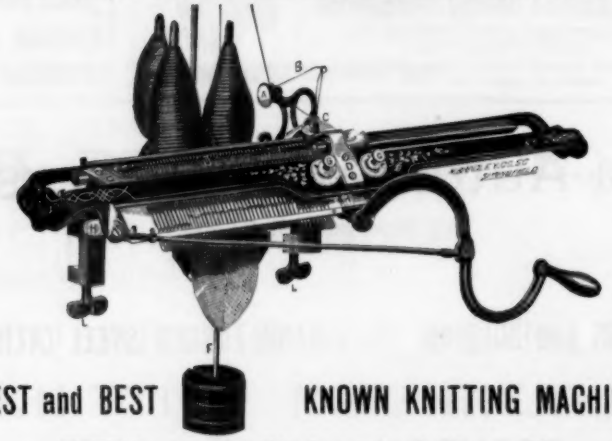
Scott & Williams,

KNITTING MACHINERY.

PHILADELPHIA,

OFFICE AND FACTORY:
2079 E. Cumberland Street. Pa., U. S. A.

THE LAMB



OLDEST and BEST KNOWN KNITTING MACHINE.

USED in every civilized country in the world.
For description, REDUCED PRICES, etc., see Catalog.

LAMB MFG. CO., P. O. Box 9888, CHICOPEE FALLS, MASS.

Or { J. E. WOODHEAD, 100 22d St., Chicago.
S. P. CURTIS, 671 Washington St., Boston.

Pepper Manufacturing Co.

Lakeport, N. H.,

Manufacturers of

Knitting Machinery,

INCLUDING

Pepper's Flat-Ribbed Cuff Machine,

Automatic Welt and Loose Course Machine for Sock Tops. New Circular Stripes with Welt, Loose Course and Striping (Automatic), for Shirt Cuffs, Sock Tops, Hose Legs, Wristers, etc.

GOLF AND BICYCLE STOCKING MACHINES.

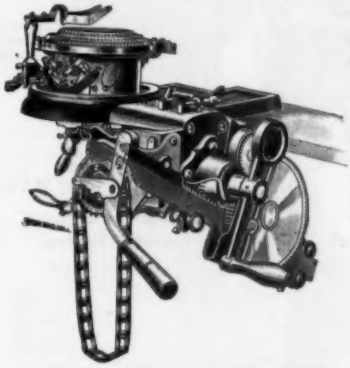
All kinds of

CIRCULAR RIBBED MACHINES,

For Men's Underwear, Ladies' and Misses' Hose Legs & Leggings.

CORRESPONDENCE SOLICITED.

Excelsior Knitting Machine Manufacturing Co.



· NEW '97 ·

¾ AUTOMATIC

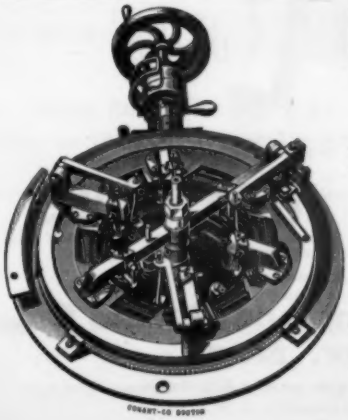
Knitting Machine.

With or without Double Sole Attachment.

Address all communications for price lists and samples to

Excelsior Knitting Machine Mfg. Co.,

Meadow and Washington Sts., ALLENTOWN, PA.



KNITTING MACHINES

of LATEST CONSTRUCTION

giving GREATEST PRODUCTION,

and with points of merit not to be found in any other style of machine for

SWEATERS,
UNDERWEAR,
LEGGINS,
ANKLETS OR CUFFS.

Automatic racking or shogging; Sweater Collar Machines.

Racked or Shogged Borders on Sweaters are our Specialties

Latched Needles for all Machines.

Leighton Machine Co., Manchester, N. H.

The Acme Automatic Knitter

Produces the greatest variety of seamless hosiery of all kinds and gauges. This machine will produce anything from a short foot to the longest hose without substituting or changing any parts whatever.

Its Range of Work is from very coarsest up to 200 needle cylinders.

It is unequalled for either Coarse Socks or Finest Ladies' Hose.

We invite Comparison

All Along the Line.

Seam in heel and toe remarkably strong and close, and heel is large and full.

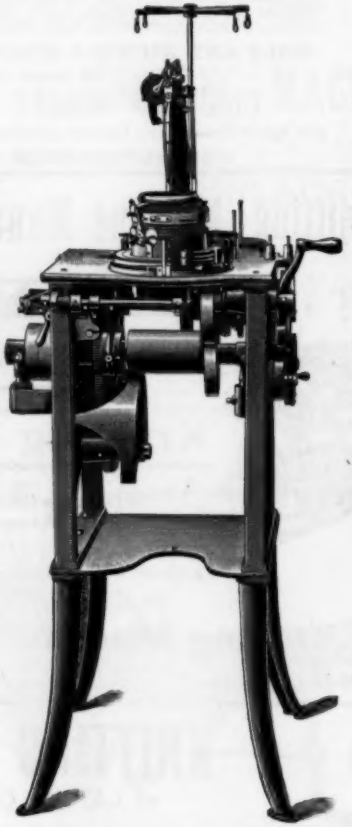
Extra thread in heel does not show in instep.

For shaping, or to accommodate varying reinforcing threads, the

Length of Stitch and Tension are Automatically Regulated. At any point.

Every movement positive and fully automatic.

Best method of *transfering ribbed legs and tops.*



High Spliced Heel

and Double Sole.

It has the *only* perfectly practical *automatic device* for changing the yarn in heel and toe.

It is Extremely Easy on Yarn

Light Running, Simple, Durable, and Economical.

A mill fitted with our machines can produce a far greater variety of weights and styles than any other machine on the market.

Improved and perfected by years of practical factory test, it has an established record on all grades, and **may fairly be termed**

A UNIVERSAL MACHINE.

Let us prove these statements in your mill.

MAYO Knitting Machine and Needle Co.,

FRANKLIN, N. H.

Philadelphia Office, corner Sixth and Arch Streets.

Address all correspondence to the main office at Franklin, N. H.

E. Jenckes Man'f'g Co.,

75 WEEDEN STREET,

PAWTUCKET, R. I.

Proprietors and Builders of

"ELECTRIC"

AUTOMATIC KNITTING MACHINE

FOR

Seamless Hosiery, Wool, Cotton or Silk,

From the Coarsest to the Finest Gauge

Among the many strong claims for this machine are

The Highest Speed,
First Quality Work.
Simple Construction,
Easy to Learn

Send for Descriptive Circular and Terms.

Philadelphia Office: 370 Bourse Building.

McMichael & Wildman MFG. CO.

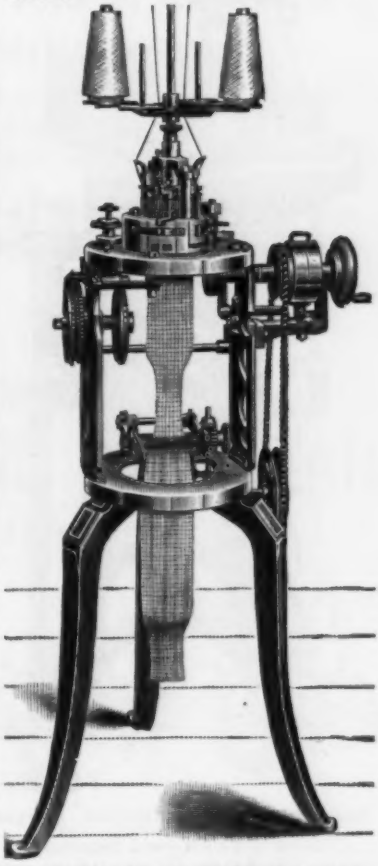
RIB KNITTING MACHINERY,

AUTOMATIC AND PLAIN,

For all classes of Ribbed Hosiery and Underwear, Combination Suits, Sweaters, etc.

ESTABLISHED REPUTATION FOR

Largest Production, Best Quality Fabric, Durability, Economy of Operation.



Automatic Sleever and Fancy Hosiery Machine.
Showing Chainless Measuring Attachment.

Full particulars, Description and Samples furnished upon Application to the

McMICHAEL & WILDMAN MFG. CO.

NORRISTOWN, PENNA.

New England Office:
120 Kingston St., Boston, Mass.

"STANDARD B"

Gives greatest production, fewest menders, less cost for maintenance and best fabrics.

More Standard in use than any Automatic Machine on the market.

The best, therefore the cheapest.

Standard Machine Co.,

508 Minor St., Philadelphia, Pa.

Estimates furnished for complete Hosiery plants.

HEPWORTH & CO.

BUILDERS OF

Loopers and Automatic Knitting Machines.

Lehigh Ave. and Mascher St.,
PHILADELPHIA, PA.

William R. Dillmore, Pres. John C. Egly, Sec. & Treas.

KEYSTONE

Knitting Machine Mfg. Co.,

MANUFACTURERS OF

All kinds of LATCH NEEDLES, including OUR FAMOUS SPRING BOTTOM NEEDLE for Seamless Knitters.

Builders of the KEYSTONE SEAMLESS KNITTERS.

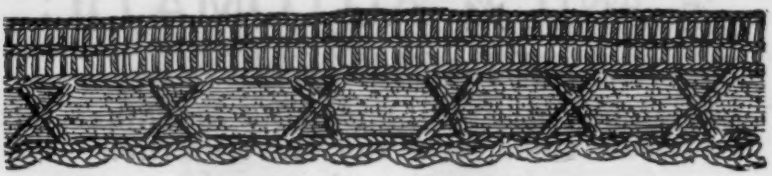
General agents for BRINTON & CO'S RIBBERS for Hosiery, Underwear, etc.

Have you seen our double knee machine?

Keystone Knitting Machine Mfg. Co.,

40 North 7th Street, PHILA.

Get it from us; it will be right.



The Same Old Story

Friedberger's line of Edgings

FOR SPRING 1899

Comprising extra fine Lace effects, coupled with exceptionally good values.
Pronounced by competent judges,

HEAD AND SHOULDERS ABOVE

Any previous attempts ever made.

INDISPUTABLY AND PRE-EMINENTLY

Superior to all other makes.

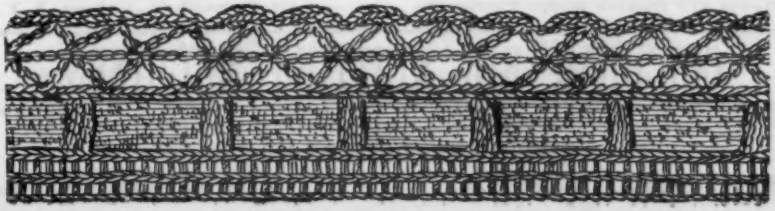
Weekly Output, - - 3,000,000 yards.

FREIDBERGER & CO.,

Mfrs. EDGINGS and BRAIDS,

MILLS AT

GERMANTOWN, - - - PHILADELPHIA.



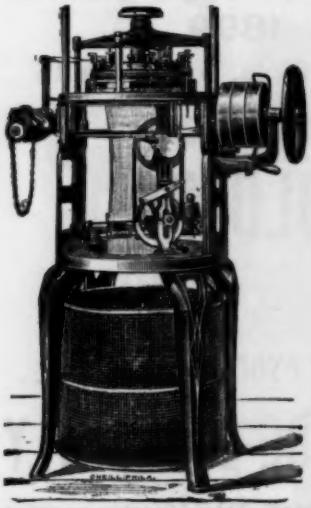
½ AND ¾ AUTOMATIC ATTACHMENTS

To Seamless Knitters, make Old Machines into New Ones, and the Best of their respective classes.

Paxton & O'Neill,

127 Bread Street, Philadelphia,

Makers of Wrought Steel Cylinders and Dials for all kinds of Machines.



JAMES TAYLOR,

New and Second-Hand Hosiery and Underwear

KNITTING MACHINERY

AND SUPPLIES.

Ribbers, Loopers, Winders, Presses, Patent Stop-Motion, Sewing Machines, Press Boards, Dry Boxes, Cylinders and Dials, Needles etc.,

Largest establishment in America making a specialty of New and Second-Hand Knitting Machinery.

SELLING AGENTS FOR

Stafford & Holt's Rib Knitting Machinery

For Underwear, Sweaters, Jackets, and Bicycle Hose.

Latest Improved Weight Take-up. Highest Grade. Highest Speed. Sectional Dial Cap and Cylinder Ring. Rigid Dial Support.

Best Machinery. Lowest Prices.

Address: 835 Arch St., Philadelphia.

THE

Merrow High Speed Crochet

and Scallop or Shell Machines,

For finishing the edges of Knit Goods, Bed Blankets, Horse Blankets, or other fabrics.

For particulars and samples, address

THE MERROW MACHINE CO.,

28 Laurel St., - Hartford, Conn.

Branch Offices and Show Rooms:

Room 374 Bourse Bldg., Phila., Pa **49 Mohawk St., Cohoes, N. Y.**

CIRCULAR RIB KNITTING MACHINES,

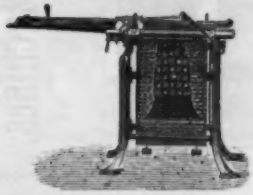
Carefully designed and well made with Solid Forged Steel Cylinders and Dials, Segmental Cam Rings, Encased Take-up, Stop Motions, etc. Standard Sizes, Reasonable Prices. Also

KNITTING MACHINE CYLINDERS AND DIALS.

STAFFORD & HOLT, - Little Falls, N. Y.

Grosser's Unrivalled

Flat Knitting Machines



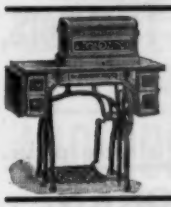
For Scotch Fancy Pattern Golf or Bicycle Stockings, Fancy Sweaters, Gloves, Mittens, Caps, Cardigan Jackets, Ladies' Skirts, etc. Seamless Shaker Sweaters (both armholes automatic, selvedge open), Theatrical and Athletic Tights. Four section full automatic power sweater machine. Four section full automatic, full-fashioned sleeve machines with automatic widening of the fabric.
SPECIALTY. Regular plain hand sweater machine, 5 needles to inch, 18 inch needle bed, with 182 needles, new improved drop-lock and two yarn carriers, front and back, for the selvedge edge, laced front and two-color striping attachment, only **$98.00** net cash.

A. MUELLER.

U. S. BRANCH OFFICE AND SHOWROOM:

760 LEXINGTON AVENUE, - BROOKLYN, N. Y

Write for Descriptive Catalogue.



I. GOLDSTEIN,

DEALER IN

Sewing Machines and Machine Needles for the Knitting Trade.

416 Arch Street,
702 South Street,
PHILADELPHIA.

Wm. Breedon & Son,

Manufacturers of

Spring Knitting Needles,

And Burr Blades of all kinds.

Amsterdam, N. Y.

Excelsior NEEDLES

The best hosiery needle in the market.

Manufactured by

Wardwell Needle Co., Lakeport, N. H.

Excelsior Sewing Machine Co.,

120 N. 7th St., Philadelphia, Pa.

Fabric trimmers put on all machines. All makes for sale, repaired, altered and rebuilt. Sole agents for Murphy's High Speed, Double-Thread, Elastic Stitch and Trimming Machine, for underwear and concealed stitch for hosiery and welting.

Boss Knitting Machine WORKS,

Elm and Reed Sts., Reading, Pa.

Manufacture the New "Improved 15-16 Automatic" and Plain Seamless Knitting Machines with or without Web-Holding Attachments. Knits Ladies' and Children's plain fashioned Hose, Half-Hose, and Footings, for fancy ribbed goods. High speed. Needs 10 skilled operators. The 15-16 runs by single belt. Automatic Tension device in leg, heel, and toe, making large perfect heel and toe. Sizes from 2 1-4 up to 4 inches in diameter.

Send for prices and particulars.

Forge Hardened Steel Cylinders a Specialty.

WM. M. YOUNG,

Manufacturer of

Double and Single Edge

Worsted Spindle Tapes,

Braided and Woven Spool Tapes and Bindings for Underwear, Shoe, Corset Strings and Round Braids.

Cotton Banding and Hook Bands. Novelty Dress and Wrapper Braids.

3638-40 Frankford Ave., Philadelphia.

THE MANUFACTURERS' SUPPLIES CO.,

66 N. Fourth St., Philadelphia, Pa.

Standard Knitting Machine Needles,

And all kinds of Sewing Machine Needles.

Parts for Wilcox & Gibbs Mfg., and all Sewing Machines.

Oils, Beltings and General Mill Supplies.

Agents for Excelsior Needle Co., and National Needle Co.

LOYAL T. IVES,

MANUFACTURER OF ALL KINDS OF

Spring Knitting Needles

NEW BRUNSWICK, N. J.

H. LYDALL & FOULDS,

Manufacturers of all kinds of

Knitting Machine Needles, Narrowing Points, Hooks, etc.

Pat. Screw Rivet Balmoral Needles a specialty

MANCHESTER, CONN.

WM. COREY CO.,

Manufacturers of Knitting Machine

Latch Needles,

MANCHESTER, N. H.

SHIRT Border Machines

Four and Five Section Flat Cuff Machines.

CHARLES COOPER, BENNINCTON, VT.,

KNITTING MACHINE AND NEEDLE WORKS,

MANUFACTURER OF

Flat Rib Knitting Machines, 2 to 5 sections, Spring and Latch Knitting Needles, Burr Wheels, Burr Blades, Collarette Attachments, etc., etc. All the latest improvements. Sinkers and all Rib Machinery supplies. Patent Springs for Dyeing Boards. Also Ribbed Anklets made to order. Branch Shop, AMSTERDAM, N. Y.

S. B. ARDREY & SONS, BRISTOL, PA., U. S.

Manufacturers of New and Improved

BRUSHING MACHINE, For Fleecing Knit Goods.

Carefully constructed, substantially built.

Filtering Oilers, Parts Removable Without Disturbing Frame.

Delicate Adjustment, High Speed with Durability.

GIBBONS FRAME

Sewing Machines, with or without Trimmers,

Welting Machines, with concealed stitch for tops of stockings.
Trimmers attached to all kinds of Sewing Machines.
New and Improved Looping Machines, stitch flat and elastic; sample of work on application.

Manufactory, Second and Diamond Sts., Philadelphia.

F. H. POWNALL IRON WORKS,

Jamesburg, N. J.

Steam Hosiery Presses a Specialty.

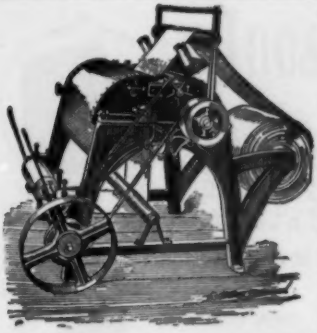
Also HOSIERY DRYERS. Write for bottom prices.

BOARDS FOR FAST BLACK DYERS.

HOSIERY FINISHING BOARDS.

BEST WORK. PROMPT SERVICE. PRICES ALWAYS RIGHT.

JOS. T. PEARSON 1815-21 TAYLOR ST. KENSINGTON PHILA



The Best Fleecing Machine

For Cotton and Woolen Knit Goods is the

"Little Hustler."

It was designed and is manufactured by a practical mill man who understands the wants of the trade.

It fleeces both sides at once, removes all burrs and shieves, does not injure or tender the cloth and can't make streaks or bare spots. Perfectly simple, economical in labor and floor space, and reasonable in price. In short, its the best thing for the purpose on the market today.

Can refer to many mills using it. Write about it.

Little Hustler Napper Co., Hudson, N. Y.

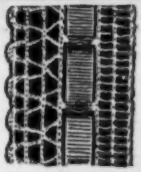
WEIMAR BROS., MANUFACTURERS OF

Silk, Cotton, Medium and Superfine, and Non-Elastic

BINDINGS.

Medium and Superfine Tapes a Specialty.

1817 East York St., Philadelphia.



LONG DISTANCE TELEPHONE 7465.

KROUT & FITE MAN'F'C CO., ... Manufacturers of

SILK AND COTTON NARROW FABRICS,

Fall Samples for 1898 now ready.

LACE EDGINGS

FOR LADIES' JERSEY RIBBED UNDERWEAR.

Spool Tapes a Specialty. 2632-40 Hascher Street, Philadelphia, Pa.

C. STOHN,

Manufacturer of **NOVELTIES**

Fancy Vestings and Button Stock.
Fast Colors Guaranteed. Shoe Tops a specialty

178 Green Street, Jamaica Plain, Mass.

LACINGS For Overshirts and Underwear,

Both Tipped and Tasseled, and

OVERSHIRT NOVELTIES.

For Samples and other information, address

HEPNER & HORWITZ, 30 Howard St., N. Y.

ORION TREAT,

MANUFACTURER OF

SCREW RIVETED BALMORAL AND DOUBLE RIB NEEDLES.

(Patented May 6. 1890.)

Manchester Green, - Conn.

All work guaranteed.

THOMAS KENNEDY,

Successor to N. H. BRUCE,
Established 1872,

COHOES, N. Y.

SPECIAL MACHINERY

for Knitting Mills, Collar and Corset Factories.

CLOTH CUTTERS—Power and Hand.
FOLDING, WINDING AND CUTTING machines, automatic.
POWER NECK MARKERS.
RIB CUTTERS.
Irregular Form

CUTTING MACHINERY

for Cloth, Knit Fabrics, etc.

☞Write for Catalogue.

STAMPING INKS In Paste Form

- - FOR Hosiery Manufacturers

SUPERIOR TO ANY IN THE MARKET.

Dry s Quickly, Always Uniform, Mixes Freely with Water, Will not Rub, Will not Settle, Will not Sour.

D. L. WITMER & BRO.,

5TH ST. AND GERMANTOWN AVE., PHILADELPHIA.

Endorsed by Board of Fire Underwriters.

SUPERIOR TO

COTTON WASTE.

Safe, Durable and Cheaper.

RAW SILK MACHINERY WIPERS.

AMERICAN SILK MFG. CO.,

311 Walnut St., PHILA., PA.

Endorsed at the recent meeting of N. E. Cotton Mfrs.

SAVOGRAN CLEANS WOOL, FLOORS ANYTHING.

INDIA ALKALI WORKS, Boston.

TO AVOID LOSS

NEVER SEND MONEY
IN LETTERS, BY MAIL.

ALWAYS

GET AN AMERICAN EXPRESS MONEY ORDER.

RATES LOWER AND SYSTEM SAFER THAN ANY OTHER METHOD.

DO NOT **CARRY MONEY WHEN TRAVELING.**

IT IS ENTIRELY UNNECESSARY IF YOU TAKE

THE **TRAVELERS CHEQUES**
OF THE **AMERICAN EXPRESS COMPANY.**

Incandescent Lamps

...12 CENTS...

Now is the time to get your burned out lamps together and have them repaired or turned into cash. We make your old incandescent lamps just as good as new. We have now repaired over 700,000, and nine out of ten of our shipments are to old customers. If you prefer new lamps, place your order with us and we will allow you three cents each for your old lamps.

LYNN INCANDESCENT LAMP CO.,

LYNN, MASS.

NEW YORK, 203 Broadway. BALTIMORE, 322 No. Front St. CINCINNATI, 414 Pike Bldg. CHICAGO, 939 Monadnock Blk

---

PL

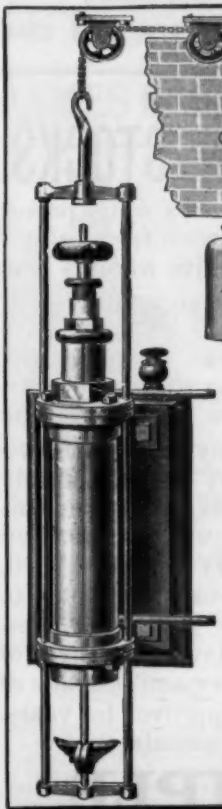
DIXON'S PERFECT LUBRICATING GRAPHITE.

The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease.

NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.

An Interesting and Instructive Pamphlet will be sent Free of Charge.

JOS. DIXON CRUCIBLE CO. Jersey City, N. J.



By All Odds

this is the best Damper Regulator on the market BECAUSE it is the most durable and simple, and is the only regulator which is guaranteed to change direction on a variation of *1-4 pound* steam pressure.

The Curtis Patent Damper Regulator

is the *standard* for close work and will control any damper. Is stylish and powerful and yet is *not expensive.*

Over 3000 installed in the last ten years.

D'ESTE & SEELEY CO.

29-33 Haverhill Street, Boston.

New York: 109 Liberty St. Chicago: 218 Lake St.

Gilbert Wood Split Pulleys

Manufactured in sizes from 8 inches to 24 feet in diameter, with interchangeable Wood Bushings, to fit all sizes of shafting.

Constructed on correct mechanical principles from thoroughly seasoned and selected lumber, and finished in a superior manner. Every Pulley warranted.

Saginaw Manufacturing Co.,

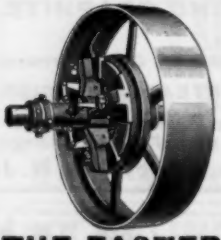
General Offices and Works, SAGINAW, MICH.

Cable Address, Engrave N. Y.
A. B. C. Code, 4th, edition.

New York Branch, 44 Dey St.
Telephone 187, Cortland.

AGENCIES IN ALL PRINCIPAL CITIES.

Perhaps Your Employees in a Portion of Your Factory



Are Not Working Today, But Your Shafting Is.

Did you ever think how much fuel, oil, wear and expense would be saved if you could shut off the power from that department with a

FRISBIE FRICTION CLUTCH.

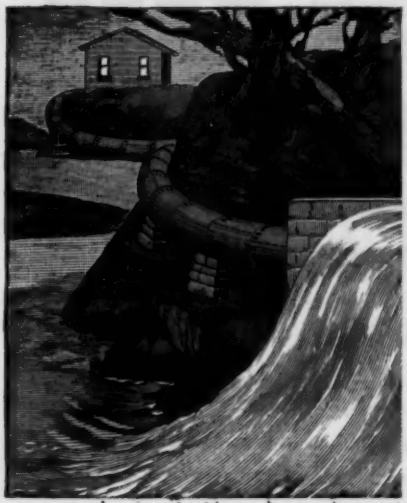
Please write us for full information.

THE EASTERN MACHINERY CO., NEW HAVEN, CONN.

MENTION THIS JOURNAL.

IMPROVED CEMENT LINED

WROUGHT STEEL PEN STOCKS.



Have you a water power that you wish to develop? or a defective wooden penstock that you must repair or replace? Then secure descriptive circular and price of my steel penstocks. They are cheaper than wood, they are indestructible, they are absolutely water tight; they are constructed on the ground where they are to be used, therefore can be adapted to the most difficult places. They will stand any head of water, they can be made of any size desired; they have been tested and approved for years. For full information and price, address the manufacturer,

GEO. DALRYMPLE,

Lock Box 466. **Fair Haven, Vt.**

WATER WHEELS

LEFFEL'S STANDARD, SPECIAL SAMSON & CASCADE

UPRIGHT AND HORIZONTAL.

Suitable for all Heads from 3 Feet to 2000 Feet.

35 Years in the Business.

Designing and building Water Wheels for all purposes and situations. These wheels secure a **High Guaranteed Percentage; Great Steadiness** under variable loads; an **Unequaled Concentration of Power,** and an **Unprecedented High Velocity. Its quickly operating balanced gates** afford **prompt** and **fine regulation** by governor.

Satisfaction Guaranteed where others fail. Write for catalogue of either wheel.

BOILERS AND ENGINES

Upright and Horizontal from 3 Horse-power upwards.

AUTOMATIC AND PLAIN SLIDE VALVE ENGINES.

Send for pamphlet illustrating and describing the Boilers and Engines.

JAMES LEFFEL & CO., Springfield, O., U.S.A.

CHRISTIANA MACHINE CO.

Christiana, Pa.

MANUFACTURERS OF

THE BALANCED GATE

TURBINE WHEEL.

Suitable for Light or Heavy Service.

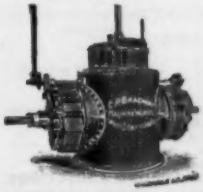
Globe Outer-Cases and Special Wrought or Cast Iron Flumes,

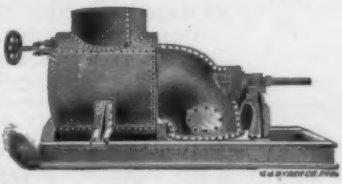
SUITABLE FOR ANY SITUATION.

GEARING of all kinds, **SHAFTING, PULLEYS,** and everything required for complete **POWER PLANT.**

Address, P. O. Box 124A.

The C. P. Bradway Turbine Water Wheel.





Through its peculiar gate construction, it is guaranteed to give better results with variable quantity of water, than any other wheel. The peculiar advantages of this wheel cannot be shown by a picture, but can easily be demonstrated to any practical man. The full gate principle at all stages of gate opening, and gate shut tight first, last and always. Will sheer off obstructions. On, two or three wheels can be set on one base. I adapt wheels to any conditions, and guarantee satisfaction. My new regulator is the simplest in construction and the most efficient in result of any in the market. It is connected to the gate either by gears or chain belt and sprocket wheels. **Price of Regulator $100.** I also make water motors, governors, steel tubing, grinding mills, and general mill machinery.

C. P. BRADWAY West Stafford, Conn.

1898 EDITION NOW READY. YOU WANT IT.

The work of delivering the book to paid-in-advance subscribers takes some time, but each will receive a copy in due course.

TEXTILE WORLD'S

DIRECTORY OF THE

MILL TRADE

IN THE UNITED STATES.

We take pride in the knowledge that our Directory is more practical, more complete, and more convenient than the Directories which have been published for years.

A BOOK OF 400 PAGES OF CONVENIENT SIZE, WITH 19 MAPS.

.... New Features for 1898 ....

COMPRISING COTTON MILLS, WOOLEN MILLS, WORSTED KNITTING MILLS, SILK MILLS, FLAX, JUTE AND LINEN MILLS, PRINT WORKS, BLEACHERIES, DYEING, FINISHING AND WOOL SCOURING ESTABLISHMENTS, ARRANGED ALPHABETICALLY BY NAME OF MILLS AND ALSO GROUPED ACCORDING TO LOCATION. ILLUSTRATED BY SPECIALLY PREPARED TEXTILE MAPS, SHOWING THE LOCATION OF MILL TOWNS AND CITIES.

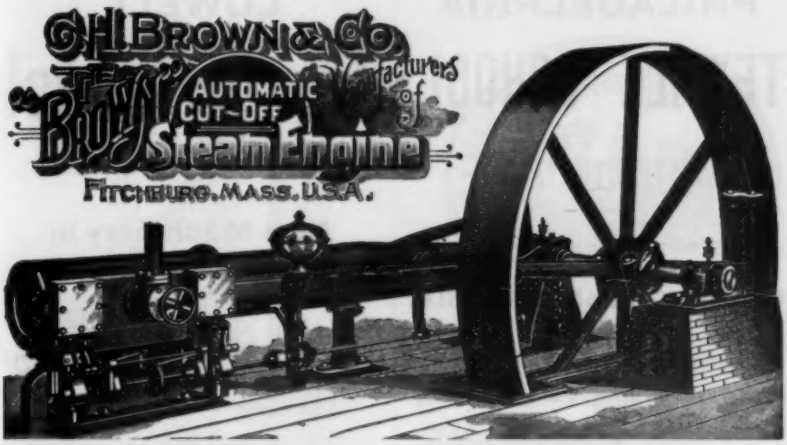
Detailed information is given about each establishment, viz., the name of the company or firm, names of officers, agent, superintendent, what the mill makes, number sets of cards and combs (if woolen), number of spindles, number of looms, whether steam or water power, whether a dye house or not, who the selling agents are, or if the mill sells direct. In many instances it gives the name of the buyer of raw materials and supplies. To the traveling man, this directory is invaluable, as the maps give the location of the towns where there are mills, so that trips may be planned. The railroad connections are given, and distances may be estimated accurately from the maps.

IT ALSO HAS LISTS OF LARGE BUYERS OF TEXTILE FABRICS FROM FIRST HANDS INCLUDING MANUFACTURERS' SELLING AGENTS AND DRY GOODS COMMISSION MERCHANTS IN PRINCIPAL CITIES; THE MANUFACTURING CLOTHIERS, SUIT AND CLOAK MAKERS, JOBBERS, LARGE RETAILERS BUYING FROM FIRST HANDS. ALSO LISTS OF DEALERS IN RAW MATERIALS IN PRINCIPAL CITIES, INCLUDIND RAG DEALERS. BUYERS' INDEX OF TEXTILE MACHINERY AND SUPPLIES.

The Lists of Buyers are of great value to the Mills.

A copy of this Directory is presented to every paid-in-advance subscriber to the TEXTILE WORLD, with the compliments of the publisher. The price to others is $2.00 or $3.00 according to binding.

Those who want the all-cloth cover book at $3.00 (including the Textile World), should speak early as the supply is limited.



Save Money and Time!

THE ECONOMICAL GAS AND AIR HEATED PRESSING IRONS

Style C.

are the most economical thing of their kind on the market, and can be heated from 50 to 75 per cent. less cost than by any other known method. They are the acme of economy, cleanliness and dispatch combined; always ready; always at just the right heat. They are used by all first-class up to date manufacturers. The "Economical" is made in every style, shape and weight, to suit all trade using pressing irons. This iron is not an atmospheric burner, but is operated by an air blast, supplied by a positive pressure blower or air pump.

MANUFACTURED BY

Stockwell & Ensor,

PATENTEES,

614 North Mount Street, BALTIMORE, MD.

A partial List of Houses using our Gas Irons.

V. Henry Rothschild & Co., Mfg. Stanley Golf Suits, New York City.
C. Kenyon Co., Mfg. Clothing, " "
The Rosenthal Mfg. Co., Mfg. Clothing, " "
Jas. F. White & Co., Mfg Hdkf., " "
Jaros Knit Fabrics, Knit Goods, " "
E. Millen & Co., Night robes and Shirts, " "
Marks Amheim, Custom Tailor, " "
Sweet, Orr & Co., Mfg. Pants, Newburg, N. Y.
Hull & Co., Mfg, Pants, Poughkeepsie, N. Y.
Pilling Mfg. Co., Knit Underwear, Phila, Pa.
Wise Bros., Mfg. Overalls, Baltimore, Md.
Guggenheimer & Co., Mfg. Pants, Lynchbug, Va.
Dixie Pants Co., Mfg. Pants, Charlotte, N. C.
J. Kyle & Co., Mfg. Pants, Columbus, Ga.
Slayden Kirksey Woolen Mills, Mfg. Pants, Waco, Texas.
The T. Eaton Co., Mfgs., Toronto, Canada.

NEW YORK OFFICE,
305 & 307 Mercer St.
C. H. Sheftall, Mgr.

Call or write for Catalogue.

Mention Textile World.

J. H. BILLINGTON & CO.,
Successors to The Danforth Belting Co.
Manufacturers of
BELTING,
Aprons for Worsted Machinery. Roller Covers and Lace Leather.
113 Chestnut St., Philadelphia, Pa.

ALEXANDER BROS.
BEST OAK BELTING.
PHILADELPHIA.

PHILADELPHIA

TEXTILE SCHOOL.

FIFTEENTH YEAR.

Instruction given in all branches of the manufacture of

Cotton, Wool and Silk.

Complete modern equipment for

Carding, Spinning, Dyeing, Weaving and Finishing.

—1898.—

Day classes open September 26th; Evening Classes open October 3d.

Endorsed by leading MANUFACTURERS and EDUCATORS.

Send for illustrated year book.

E. W. FRANCE, Director,

BROAD AND PINE STS., PHILADELPHIA.

The American

Correspondence School

Of Textiles,

Lowell, Mass.

Gives Instruction in Textile Manufacturing by mail to any part of the world.

A Complete

TEXTILE TECHNICAL EDUCATION

can be obtained at a moderate cost, and without loss of present occupation. Special Sectional Courses are given in any or all branches of Cotton, Wool, or Worsted Manufacturing, Designing or Mill Engineering.

For particulars address,

C. P. BROOKS,
Director.

LOWELL

Textile School

Thoroughly practical instruction given on

New Machinery in Every Branch of

Textile Manufacturing.

The most complete Textile School in America.

Entrance examination will be held on September 22 and 23.

Send for Catalogue to

WM. W. CROSBY, Principal.

LOWELL, MASS.

JAMES H. QUILTER,

Certified Teacher of Frame-Work Knitting. City and Guild, of London Institute, England.

Information given on all subjects relating to the manufacture and finishing of Hosiery and Hosiery Fabrics.

Estimates given for all kinds of machinery used in the knitting and allied trades.

Editor and Sole Proprietor of the

KNITTERS CIRCULAR

AND MONTHLY RECORD.

The only British journal solely devoted to the interest of the hosiery trade.

Annual Subscription, post free, 50 cts.

Send for sample copy.

ADDRESS:

11 Millstone Lane,
LEICESTER, England.

P. BLAISDELL & CO.,

Machinists' Tools

WORCESTER, MASS.

ORGANIZED, 1866.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO. HARTFORD, CONN.

Thorough Inspections

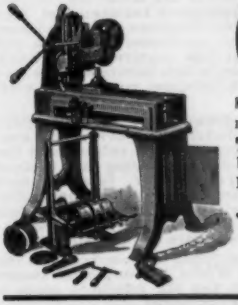
AND

INSURANCE against Loss or Damage to Property and Loss of Life and Injury to Persons caused by

STEAM BOILER EXPLOSIONS.

J. M. ALLEN, President.
WM. B. FRANKLIN, Vice-President.
F. B. ALLEN, Second Vice-President.
J. B. PIERCE, Secretary and Treasurer

MODERATE PRICED



Gear Cutting Machine.

E specially adapted for use in Repair Shops. Now in use in nearly **ONE HUNDRED** representative mills, including **Twelve** in Fall River, Mass. On application, we shall be glad to submit full particulars, prices, and photographs of latest improvements. Send for our Sheet of References.

THE D. E. WHITON MACHINE CO.,

19 Oak Street, New London, Conn.

CLOTH BOARDS

—AND—

BOX SHOOKS.

I know just what manufacturers want and can supply them at the bottom prices. Write me.

E. A. FLANDERS,

North Dexter Maine.

THAD. S. COBB MACHINERY CO.

COTTON and WOOLEN MACHINERY.

Belting, Card Clothing & Mill Supplies.

192-194 Middle St., Lowell, Mass.

SULLIVAN MACHINERY CO.,

100 Main St., Claremont, N. H.

Chicago Office, 55 North Clinton St.

MANUFACTURERS OF

Paper Fibre Roving Cans, (seamless, light and durable,) and Hand Power Baling Presses for Cotton Waste, Rags, Paper Stock, etc.

10 CENTS

Stamps will do.

We have purchased from the author, W. S. Kelley, the balance of the edition of his pamphlet on Cotton Preparation and the Standard Yarn Tables. Although published ten years ago, much of the matter is as good as ever and well worth 10 cents, at which price we will close them out.

Table of Contents.

Cotton: Characteristic Features
Illustration of Cotton Fibre
Cotton: Inspection and Selection
Mixing and Opening
Process
Machinery and Power
Twist and Elasticity
Temperature and Humidity
Numbering and Testing
Yarn-testing Apparatus
Explanation of Tables
Standard Strength Tables (Four Qualities)
Standard Table (Good Quality), to Quarter Numbers
Draper's Strength Table
Hyde's Strength Table
Table for Numbering Yarn
Grades and Comparative Prices of Cotton
Convenient Multipliers
Yarn Number—Metric System
Thermometer Notation Rules
Metric System
Metric Equivalents
Cost of Patents

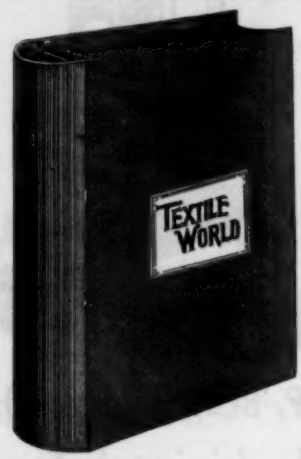
SEND 10c. IN STAMPS

And we will send you a copy postpaid.

CUILD & LORD,

620 ATLANTIC AVENUE, BOSTON, MASS.

-1897- BINDER.



It is the best binder ever invented. It takes only half a minute to insert the magazine, and thereafter it is kept clean, and can always be found when wanted. A single binder will hold **one volume (6 numbers) of the Textile World.** When it is complete it can be filed away in your library as a most valuable book of reference for the year 1898.

As a method of keeping your Worlds for future use, it is worth ten times its cost. It makes all the difference between lost, torn and dirtied copies, scattered about the house or office in such confusion that you can never find what you require, and a handsome, orderly file, which becomes at the end of the year a handsome volume for your library.

A single copy found when wanted repays the cost of the binder twice over. We cannot too strongly urge upon subscribers the great importance of preserving each issue of this magazine in our binder. In a few years you will have an encyclopedia unequalled in character, variety and timeliness. In this way you can in a short time possess a real library without expense to yourself.

The binder has strong cloth covers and the name "Textile World" stamped as shown in illustration. The six numbers make a volume of about 1000 pages.

The Binder will be sent postage paid to any address on receipt of 65 cents. (Stamps will do.)

SPECIAL OFFER.

To any present subscriber who will get us a new subscription to the TEXTILE WORLD and send $2.00 to pay for the same, we will send the Binder free.

GUILD & LORD, - Publishers,

620 Atlantic Avenue,

BOSTON, MASS.

The Textile World's Information Department and Employment Bureau

Is the BEST system of communication between manufacturers wanting men and superintendents and overseers wanting positions.

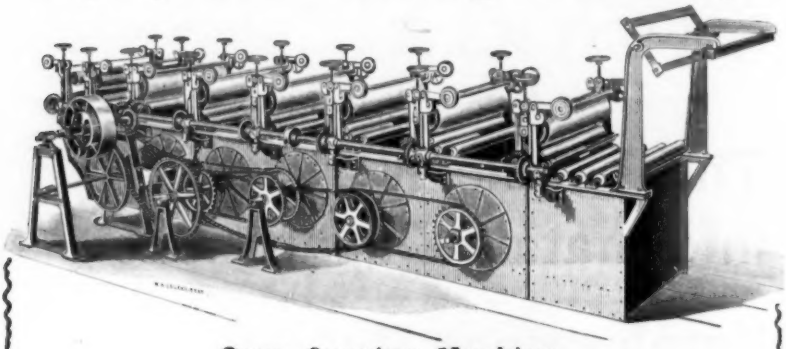
There is no charge to manufacturers, nor is there any "entrance fee" to applicants, but if a position is secured a very moderate charge is made to the applicant. We will not knowingly enter the name of an incompetent or intemperate man.

Hundreds of superintendents and overseers are now satisfactorily filling positions obtained through us, and scores of the best mills use this Bureau EXCLUSIVELY, because they have found it to be the best and most satisfactory. Its methods are prompt, courteous, business-like and strictly confidential.

Correspondence solicited.

TEXTILE WORLD'S INFORMATION DEPARTMENT,
620 Atlantic Ave., Boston, Mass.

Drying and Finishing Machinery.



Open Soaping Machine.

This new pattern machine overcomes the difficulty heretofore found in making a machine that would thoroughly wash and soap both light and heavy goods. The cloth runs over extra large beaters, first on one side and then on other. By a simple arrangement of copper buckets driven in an opposite direction to that of the cloth, water is forced through the fabric from opposite sides alternately. The squeeze and drag rolls do their work just right. There isn't space to tell their peculiar merits here, but we guarantee to do more and better work with this machine than any other of equal size made. We should like to send a catalogue with full description of it, as well as of our complete line of drying and finishing machinery, and answer any questions, or furnish estimates.

THE THOMAS PHILLIPS CO.,

PROVIDENCE, R. I.

MUTUAL BOILER INSURANCE CO.,

OF BOSTON.

DIRECTORS—Edward Atkinson, Geo. W. Wheelwright, F. B. Blake, Chas. F. Fairbanks, J. W. Farwell, A. B. Silsbee, Harcourt Amory, A. M. Goodale.

EDWARD ATKINSON, President. D. W. LANE, Secretary and Treasurer.

Inspections made Frequently and in a Thorough Manner.

POLICIES COVER DAMAGE TO PROPERTY AND EMPLOYEES.

Specifications given for Boilers and Settings.

Expert reports on relative value of coals; on steam boiler and pipe coverings; on stoking and economy in handling coal, and other matters affecting the manufacture of steam.

Telephone, 443. **31 Milk Street, BOSTON.**

WE DELIVER on trial or approval, not to be paid for unless giving perfect satisfaction

YORKSHIRE BOILER COMPOUND.

Used in England and the U. S. for the past 50 years, by largest manufacturing and power plants

SCALE AND WATER ANALYZED FREE. Also

CARR'S SOLDERING CRYSTALS, For Canning and Electrical Purposes.

Testimonials and References on Application.

CARR MANUFACTURING CO., 69 Beverly St., BOSTON, - MASS.

B. F. STURTEVANT COMPANY,

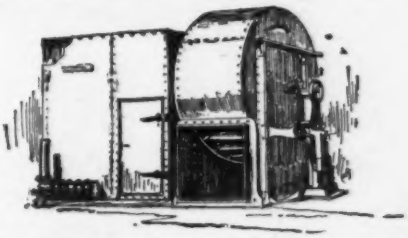
MANUFACTURERS OF THE

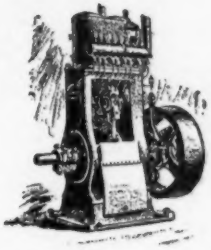
STURTEVANT BLOWERS, Etc.,

Boston, Mass., U. S. A.

The

STURTEVANT SYSTEM



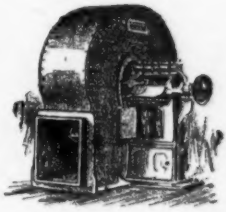


for HEATING and VENTILATING TEXTILE MILLS.

for DRYING and HANDLING RAW STOCK.

for DRYING, TENTERING and OXIDIZING PLANTS.

for Removing STEAM from DYE HOUSES, SLASHERS, DRY CANS, etc., etc.



for Removing waste from FRENCH NAPPERS and collecting same.

for FORCED or INDUCED DRAFT on BOILER PLANTS.

SPECIAL BLOWERS AND ENGINES FOR EVERY DUTY.

Electric Motors and Dynamos, Electric Fans, Exhaust Heads, Steam Traps and Forges.

Plans, Estimates and Catalogues Cheerfully Furnished.

B. F. Sturtevant Company,

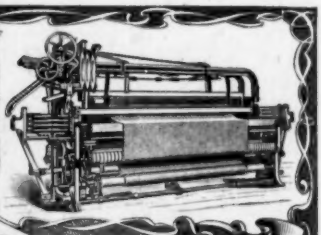
34 Oliver Street, Boston, Mass.
131 Liberty Street, New York, N. Y.
135 North Third Street, Philadelphia, Pa.
16 South Canal Street, Chicago, Ill.
75 Queen Victoria Street, London, E. C. Eng.
21 West Nile Street, Glasgow, Scotland.
4 Neue Promenade, Berlin, Germany.
2 Kungsholmstorg, Stockholm, Sweden.

189 Front St., New York.
Branch Offices: 19 Pearl Street, Boston. 31 South Front St., Philadelphia.

K. OEHLER'S
ANILINE SALT,
BLOOD ALBUMEN,
DYE-STUFFS, DYE-WOOD EXTRACTS.

9,000 BRAMWELL FEEDS and over **10,000** APPERLY FEEDS have been built and are running in American Mills.
They are the Standard of Excellence.
GEO. S. HARWOOD & SON, Builders, 53 STATE ST., BOSTON.

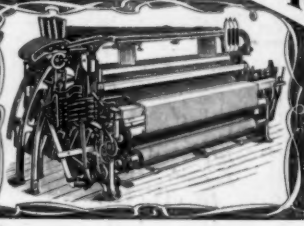
BUILDERS OF PLAIN AND FANCY LOOMS



CROMPTON & KNOWLES LOOM WORKS.

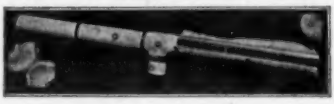
WORCESTER, MASS.

BRANCH WORKS, PROVIDENCE, R. I.



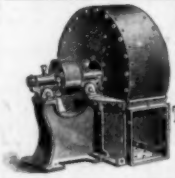
FOR WEAVING EVERY KNOWN TYPE OF TEXTILE FABRIC.

THE SPENCER AUTOMATIC WOOL OILER **SAVES** OIL, LABOR and WASTE.
Geo. S. Harwood & Son, SOLE SELLING AGENTS, 53 State St., - Boston.



Robert A. Keasbey,
54 Warren St., New York, N. Y.

ABSOLUTELY-FIREPROOF.
K & M **MAGNESIA**
SECTIONAL STEAM PIPE and BOILER COVERINGS.
The Great Coal Saver.



FANS For handling all kinds of
...DUST.
Dust Collectors and Blow Piping.
The Allington & Curtis Mfg. Co.
Saginaw, E. S. Mich.
29 Otis Street.
EAST CAMBRIDGE, MASS.

Bristol's Patent Steel Belt Lacing.

SAVES
TIME, BELTS
MONEY.
Greatest Strength with Least Metal.
Send for Circulars and Free Samples.
THE BRISTOL CO., - WATERBURY, CONN

JOHN W. FERGUSON,
Builder and General Contractor.
Office, Paterson Nat. Bank, Paterson, N. J.
Mill Building a Specialty.
References made to some of the largest mill owners in the Middle States, including Clark Thread Co., Newark, N. J.; Barbour Flax Spinning Co., Paterson, N. J., and others.

BRIDGES BERLIN BUILDINGS

OUR CATALOGUE
OF THREE HUNDRED PAGES ILLUSTRATING AND DESCRIBING A LARGE NUMBER OF
BRIDGES
BUILDINGS
AND ROOFS
Designed and Built by us
Is now ready and will be sent on application.
THE BERLIN IRON BRIDGE CO.
EAST BERLIN, CONN.

A. KLIPSTEIN & CO.,

122 Pearl St.,
NEW YORK.

Dyestuffs and Chemicals.

BRANCHES:
Boston, Philadelphia, Providence, Chicago, Cincinnati, Hamilton, Ont.
See Special advertisement inside.

SHAFTING

BEARINGS
PULLEYS
CEARINGS

Link Belt Elevators & Conveyors
Largest Manufacturers in U. S.
See Advertisement on inside front part.

THE LINK-BELT MACHINERY CO., - - - CHICAGO, U. S. A.